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FACILITATING MIDWIFERY INVOLVEMENT IN MANAGING GESTATIONAL WEIGHT GAIN IN PREGNANT WOMEN LIVING WITH OBESITY

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**UNIVERSITY OF
PLYMOUTH**

**FACILITATING MIDWIFERY INVOLVEMENT IN MANAGING GESTATIONAL
WEIGHT GAIN IN PREGNANT WOMEN LIVING WITH OBESITY**

by

EMMA LOUISE HAZELDINE

A thesis submitted to Plymouth University
in partial fulfilment for the degree of

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AUTHOR'S DECLARATION

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Graduate Sub-Committee.

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Abstract

Emma Louise Hazeldine

Facilitating midwifery involvement in managing gestational weight gain in pregnant women living with obesity.

Overview: Pregnant women living with obesity are at increased risk of pregnancy complications, with risks rising as Body Mass Index (BMI) increases. Midwives are willing to support women with managing their gestational weight gain but lack confidence and access to supporting resources. In the UK there are no interventions that aim to change the intention and behaviour of midwives, to support women with managing their gestational weight gain. The Theory of Planned Behaviour (TPB) (Ajzen, 1985) was utilised to frame the design of a behaviour change intervention for midwives. This three-phase study conducted a qualitative needs assessment, intervention design, and a quantitative study of, intervention testing.

Methods: Phase One: Interview data were thematically analysed and the TPB utilised to elicit participants' salient beliefs, to inform intervention design. Phase Two: The design of the intervention, and the TPB scale, were informed by Phase One data. Midwives reviewed the intervention and participated in a pilot test of the scale. Phase Three: The intervention was tested in a before-and-after controlled trial, utilising the refined TPB scale.

Results: Phase One: 4 key themes emerged: 1) *The current state of affairs* 2) *Perspectives on an intervention: what may work* 3) *Influences on uptake and successful weight control* 4) *Taking things forward*. Phase Two: An intervention to facilitate the involvement of community midwives in supporting weight management for pregnant women living with obesity; a booklet about weight management in pregnancy; and a TPB scale were designed. Recommendations from midwives were integrated into the final intervention resource, and pilot testing of the scale led to refinement for use in phase 3. Phase Three: Midwives in the intervention group increased their intention to offer weight management support to pregnant women living with obesity. Furthermore, midwives in the intervention group increased actual weight management support for pregnant women living with obesity, after participating in the intervention.

Conclusions: This study made a unique contribution to new knowledge by developing and testing a novel intervention that was underpinned by health psychology theory, which increased the intention and behaviour of community midwives to support pregnant women living with obesity, with managing their gestational weight gain.

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Background

Although guidance by the National Institute for Health and Care Excellence (NICE, PH27) (2010) states that midwives should take an active role in “weight management, before, during and after pregnancy” and suggests that they should “have the skills to advise on the health benefit of weight management and risks of being overweight or obese” and “ensure they have behaviour change knowledge, skills and competencies”; studies have found that a significant proportion of midwives do not. This study strove to understand why many midwives avoided broaching the subject of weight management in pregnancy and did not offer support with controlling gestational weight gain (GWG) to women whom they had identified as obese at the start of their pregnancy. This study was grounded in the views and experiences of pregnant women living with obesity, midwives and other health professionals involved in maternity care in order to examine within a sound theoretical framework, what influenced the decisions of midwives to engage or not with managing GWG to support optimal outcome for pregnant women living with obesity.

The World Health Organisation (2000) classified levels of obesity as globally epidemic and responsible for the significant increase in non-communicable diseases. Table 1.1, reports the WHO International Classification of adult normal weight, overweight and obesity according to BMI (1995, 2000 & 2004). For the first time in history, overnutrition is responsible for a greater number of deaths globally than undernutrition. As a nation our weight is increasing, with an average of 27% of the United Kingdom (UK) adult population currently obese, (BMI) of >30), with an obesity rate of 39% in women belonging to the second lowest income quintile (NHS Digital, 2017).

Table 1.1: The International Classification of adult normal weight, overweight and obesity according to BMI.

BMI kg/m^2	Weight Category
18.5 – 24.99	Normal
25 -29.99	Overweight
30 – 34.99	Obese class I
35 – 39.99	Obese class II
≥ 40	Obese class III

Source: Adapted from WHO, 1995, WHO, 2000 and WHO 2004.

In 2013 the number of adults with morbid obesity in the UK had doubled to more than one million in a twenty year period (Academy of Medical Royal Colleges, 2013) and the trend continues upward (NHS Digital, 2017). The WHO (2006) identified that determinants of overweight and obesity included biological, psychological and sociological factors. The impact of obesity permeates all aspects of healthcare and is too pervasive to be addressed by any one agent. The Academy of Medical Royal Colleges spoke out in a report representing the majority of the UK's 220,000 practising doctors in 'Measuring Up' (2013); acknowledging that there were no conclusive answers for how to help people control their weight and make healthy choices but that it was imperative that all agencies, services and individuals take action towards finding some answers.

There were 698, 512 live births in the UK in 2013 and obesity affected the childbearing population with approximately 16% of women in England classified as obese at the start of their pregnancy (Heslehurst et al, 2010). The incidence of obesity at the start of pregnancy has increased since 2010 and Maternity Services Monthly Statistics September 2017, reported the rate of obesity at nearer 20%, with variation according to the region. Data the births of 43 066 babies born in September found that obesity at the start of pregnancy was

highest in The North of England (24%) and lowest in London (17%) (NHS Digital, 2018). Obesity in pregnancy increases the risk of hypertension, Gestational Diabetes Mellitus (GDM), thromboembolism, difficulties monitoring, and delivery complications, neonatal and maternal death and the risks increase relative to the level of obesity. Furthermore, research has identified a relationship between maternal (parental) obesity and adult obesity in the offspring. It would seem unlikely therefore that a pregnant woman living with obesity, and those who care for her throughout her pregnancy would not seek to optimise health outcomes for her and her baby by managing GWG during the pregnancy. However the potential for offending, upsetting, frightening, angering or disengaging obese pregnant women from maternity service was present in research conducted by Christenson et al (2018); Furness et al (2015) and Mulherin et al (2013). It could, therefore, be suggested that it is imperative that those at the frontline of maternity care delivery are well informed, confident and able to offer support to women in a manner that is positive and encouraging.

Pregnancy is a time when weight gain is inevitable and must be individual, and it would be impossible to give an exact weight gain figure that would ensure the development and safe passage of each and every baby. Guidelines were developed in the United States (US) by the Institute of Medicine (2009) and within those guidelines, there were indeed variations in the recommended weight gain between weight categories of underweight, normal weight, overweight and women living with obesity but not between the categories of obesity I, II and III (IOM & NRC, 2009). Research has found that those who were category III obese were at the greatest risk of all negative health and maternity outcomes (Stubert et al, 2018; Hernandez et al, 2007). The relative infancy of obesity in pregnancy as a potential health threat for a significant percentage of pregnant women has meant that research, policy, guidelines, resources and

information are novel and evolving. In short, recommendation and relevant information regarding weight gain in pregnancy, for pregnant women living with obesity, does exist in the US, but is limited in the UK and has not been consistently disseminated, accessed and understood.

Research has suggested that managing GWG in pregnant women living with obesity has not been straightforward. There was no conclusive and consistent evidence of dietary and lifestyle interventions for pregnant women living with obesity, that successfully managed their GWG (Campbell et al, 2010). It could be suggested that there were many potential limitations to dietary and lifestyle interventions aimed at pregnant women living with obesity, that ranged from cost concerns of an intervention if it were delivered by someone not already involved in the woman's maternity care; to considerations such as additional appointments that a pregnant woman may need to attend, and associated inconvenience. Furthermore, it could be suggested that a third party intervention such as a class or telephone counselling consultation, that involved a number of sessions or weeks, was likely to be effective for the most part during the intervention period and for the individuals that took part in the intervention, but not necessarily beyond.

Considering the majority of cases, the people who have the greatest amount of contact with a pregnant woman, coupled with a particular bond of trust are community midwives. As the frontline of maternity care, community midwives are ideally placed to offer advice and support to pregnant women living with obesity who may want support with controlling their GWG (NICE, 2012). It is a requirement of community midwife to calculate BMI and refer women to the additional appointments that they are advised to attend if they have a BMI that exceeds certain thresholds i.e. ≥ 30 dietetic appointment & Glucose Tolerance

Test, ≥ 40 consultant care and anaesthetic consultation (NICE, 2012). Community midwives are therefore required already to address concerns around raised BMI with women who start their pregnancy obese. In order to complete and submit the records that allow them to register the woman's pregnancy, community midwives must discuss these clinical aspects with the woman. NICE (2010) also require that for pregnant women who start their pregnancy as category I and II obese, support for managing their GWG should be delivered by the midwife but in practice, this has not consistently happened (Macleod et al 2012). Midwives have talked about feeling unwilling or unable to offer support to pregnant women living with obesity, for many reasons, including a lack of confidence in their own understanding of pregnancy weight management, previous hostile reactions from pregnant women, fear of offending women and resulting disengagement from service (Christenson et al, 2018; Atkinson et al, 2017; Furness et al, 2015 and Furness et al, 2011). It could be argued that by identifying the perceived barriers experienced by community midwives to their offering effective support to pregnant women living with obesity, an intervention could be developed to address those barriers and facilitate midwifery involvement in managing GWG for those women.

1.1 The benefits of supporting the control of gestational weight gain in pregnant women living with obesity

In a review of over 49 000 deliveries, that studied medical complications associated with pregnancy, Fuchs et al (2017) found that obesity was significantly associated with hypertension, pre-eclampsia, macrosomia, stillbirth and caesarean delivery. Similarly, an observational cohort study of 56 101 women found that both normal weight and overweight women who gained a greater amount of weight than the IOM and NRC (2009) recommendations were

significantly more likely to experience hypertension, large babies, pre-eclampsia and emergency caesarean (Haugen et al, 2014). Notably, 66% of the women living with obesity gained in excess of IOM and NRC (2009) recommended GWG. Further details regarding the IOM and NRC (2009) guidance are presented in chapter two of this thesis. Since obesity at the inception of pregnancy is an independent risk factor for a number of gestational health concerns, when coupled with the additional challenge to maternity health presented by gaining weight in excess of the IOM and NRC (2009) recommended guidelines, the risks presented by excessive GWG in women starting pregnancy with a BMI ≥ 30 are significant. It is beneficial for pregnant women living with obesity to limit their GWG to within Institute of Medicine (2009) recommended guidelines in order to optimise their chances of a healthy pregnancy.

Hernandez et al (2007), found that the risk of delivery complications increased in parallel with increasing weight category. In simple terms, the more obese a woman was, the more difficult it was to monitor fetal growth and development during the pregnancy, and the more likely it was that there would be complications during the birth (Fuchs et al, 2013). A review of the literature concerning the risks to mother and child that were associated with obesity found that each 10% increase in pre-pregnancy BMI increased the relative risk of GDM and hypertension at the concurrent rate of 10% (Stubert et al, 2018). Furthermore, Stubert et al (2018) approximated that 11% of neonatal deaths may be ascribed to overweight and obesity. Women in the highest weight category (class III obese) were most likely to have a caesarean delivery, more likely than those in class II or I obese. It is therefore advantageous for pregnant women living with obesity to manage their GWG to reduce the risk of potential migration into higher weight categories. A study evaluating the costs of obesity

to maternity care identified that pregnant women who were living with obesity, cost the NHS 37% more than pregnant women of a normal weight. Women living with obesity spent on average 30% more time in hospital and accessed up to 20% more health services (Morgan et al, 2015). There is justification for supporting the control of GWG in pregnant women living with obesity, in order to try and lessen this need for increased care.

1.1.1 Physical benefits to pregnant women and their infants

Obesity during pregnancy was found to be directly associated with increased health risks for women such as gestational diabetes, hypertension, and delivery complications (Stubert et al, 2018; Scott-Pillai et al, 2013); with a subsequent need for enhanced maternity care and increased costs of care (Morgan et al, 2015; Denison et al, 2009; Wuntakal, 2009).

Maternal obesity has been found to pose increased health risks to the infant with the development of an obese phenotype (Desai et al, 2011), poorer newborn vascular health (Begg et al, 2013) and newborns that required hospital admission (Scott-Pillai et al, 2013). Having a GWG that exceeded IOM and NRC (2009) recommendation was found to increase the odds of having an overweight or obese child by 46% when controlled for all other variables including the pre-pregnancy weight category of the mother (Sridhar et al, 2014). There were, it would seem, two effects at play, body weight at the start of pregnancy and weight gain during pregnancy. Whilst it is unlikely that a woman, who is obese at the start of her pregnancy, will cease to be obese during her pregnancy, there is potential for controlling the influence of her body weight on offspring health by managing her weight so that she does not increase her weight category. Furthermore, controlling her GWG to within IOM and NRC

(2009) recommendations reduces the odds of her infant becoming an overweight or obese child.

1.1.2 Benefits to Public Health and Maternity Service

There is a significant cost to public health of obesity in pregnancy. The additional services that may be required for an obese, pregnant woman include: Glucose Tolerance Test (GTT) and subsequent attendance at a diabetic antenatal clinic if there is a diagnosis of GDM; dietetic referral, consultant led care, anaesthetic review, the provision of bariatric equipment and caesarean delivery (NICE, 2012). The maternity care required for a woman classified as obese costs significantly more than that of the maternity care required by a woman classified as a healthy weight (Morgan et al, 2015). Morgan et al (2015) identified a 37% increase in the cost of NHS maternity care in Wales, for women living with obesity, compared to healthy weight women in the years 2011-2012. In the Health Economics Research Unit (HERU) briefing paper 2014, Denison and colleagues (2014) examined anonymised data of all singleton pregnancies in Scotland between 2003 and 2010 and calculated that all weight categories outside of 'healthy' carried an increased rate of admissions and complications. Maternity care cost increased alongside weight category with the greatest cost increases seen in the highest weight categories at a £399.08 per person increase for women living with obesity and a £754.93 per person increase for women living with class III obesity (Denison et al, 2014). As the UK population becomes increasingly overweight, the costs to service increase (Morgan et al, 2015). Controlling the GWG of a pregnant woman living with obesity, so that IOM and NRC (2009) guidelines are not exceeded may control the level of enhanced maternity care that she requires. Across the population, this must contribute to stretching resources a little further in the UK.

1.2 The problems associated with supporting the control of gestational weight gain in pregnant women living with obesity

Evidence suggested that advice relating to diet and physical activity in pregnancy was inconsistent, as well as sometimes being ineffectual (Campbell et al, 2010). Many midwives and health professionals at the forefront of maternity care lacked the confidence to discuss body weight and weight gain during pregnancy with women living with obesity. Furthermore, maternity health professionals identified that further training specifically concerning the maternity care of women living with obesity was required to enhance their ability to support women living with obesity during pregnancy .

1.2.1 No consistent evidence for successful strategies

In 2010 a comprehensive systematic review of dietary and/or physical activity interventions for controlling weight gain in pregnancy was commissioned by the NICE Centre for Public Health Excellence and produced by the ScHARR Public Health Collaborating Centre (Campbell et al, 2010). Key to the development of public health guidance for promoting weight management in pregnancy; this extensive review of the literature found few studies that appraised the effectiveness of dietary and/or physical exercise intervention on gestational weight management and those included indicated inconsistent and inconclusive findings (Campbell et al, 2010). Dodd et al (2008) had also previously concluded that the limited literature available was not sufficient to assess the impact of dietary and lifestyle intervention on maternal and fetal outcomes in their earlier systematic review. A Cochrane systematic review conducted in 2015 (Muktabhant et al, 2015) found the main effect of diet or exercise intervention in managing gestational weight gain. The methods of the studies reviewed varied widely (dietary, exercise and both) and findings were mixed concerning maternal

and fetal outcomes, however, Muktabhant et al (2015) stated that utilising an intervention reduced excessive GWG by about 20%. A subsequent systematic review was conducted that reviewed dietary interventions for managing gestational weight gain and GDM in women who were overweight, or living with obesity (Lamminpaa et al, 2017). Lamminpaa et al (2017) concluded that although some significant differences between control and intervention groups were found in the studies that they reviewed, there was so much variability in the methods used, and inconsistency in their findings, that it was not possible to draw conclusions about what aspects of intervention were effective. Lamminpaa et al (2017) also noted that most interventions focussed on changing the behaviour of women, rather than health professionals in order to enable them to implement weight management into their practice.

1.2.2 The beliefs and confidence of midwives

The Quality Standard for Antenatal Care (NICE, 2012, QS22) stated that women with a BMI ≥ 30 at booking should receive personalised healthy eating and physical activity advice from a trained professional, and suggested that whilst this advice may be delivered by dietitians, for women who were living with class I and II obesity, this support may be delivered by midwives and obstetric staff. NICE (2012) stated that health professionals should offer women this personalised support themselves at the booking appointment unless they were insufficiently trained to do this, in which case they should refer to an appropriately trained professional. Whether all health professionals who encounter women at their booking appointment are or perceive that they are, sufficiently trained, is doubtful. Macleod et al (2012), in a survey of midwives from a range of hospital and midwifery settings, found that less than half of their respondents were convinced that weight management advice should be

delivered by midwives, and even fewer reported that they personally provided guidance about appropriate weight gain during pregnancy regularly to pregnant women living with obesity. A US survey of 546 certified midwives/nurse-midwives found that midwives reported increasing 'discomfort' with their care of pregnant women concurrent with increased BMI (Reither et al, 2018). A web-based survey of 4770 midwives reported that midwives attitude to nutrition during pregnancy was positive, however their nutritional knowledge in specific areas that included GWG was inadequate, and consequently, their confidence in discussing nutrition in pregnancy was low (Arrish, et al 2016).

Midwives reported increased difficulty performing the tasks of maternity care in women with a raised BMI (Reither, 2018). Difficulty monitoring the fetus which sometimes resulted in a level of hostility from anxious women, birth complications and increased rates of neonatal and maternal death, presented additional challenges to the delivery of optimal maternity care for midwives. It is a requirement of the current maternity care pathway that midwives must offer additional maternity services at key BMI thresholds such as the GTT, anaesthetic review & consultant led care. Many women reported not being entirely aware of the reason that they had been referred for these additional services (Atkinson, 2017), however, it is a requirement of the midwife to make these referrals, and explain why it is they are referring the woman. Inherently this requires the midwife to discuss the woman's raised BMI with her. Not only does referring a woman for enhanced maternity care increase the task load for the midwife, but it also necessitates that the midwife broaches the subject of the woman's body weight and discuss with her the risks that her body weight places on her and her infant's health. Midwives have expressed concern about harming the relationship that they have with women if communication about weight and weight management was not satisfactorily managed (Christenson et

al, 2018; Schmied et al, 2011). In a study that conducted latent content analysis on the semi-structured interview data of 17 midwives, themes included “toning down the risks”, and “avoiding talking about weight”, in order to avoid upsetting pregnant women (Christenson et al, 2018). Further subthemes described the conflict that midwives felt concerning the responsibilities of their role, and the deficiencies that they felt their work situation presented them with, which prevented their avoiding involvement with GWG weight management (Christenson et al, 2018). It could be suggested therefore that supporting midwives with communicating about body weight and weight gain during pregnancy may help to safeguard the bond of trust that they have with pregnant women.

1.3 Platform for research

Previous research into controlling GWG during pregnancy had largely been in the form of programmes designed and delivered by the researcher(s), to pregnant women, and assessed for improved outcomes; measured often by the amount of GWG. Whilst there was nothing inherently wrong with this body of research, and findings from this research have contributed to the growing body of endeavours to support controlling GWG in pregnant women living with obesity; it was the case that no consistent and conclusive evidence had been established, for effective interventions.

Without established evidence for what aspects of an intervention may work, it was important in this study to gather an evidence-base that would inform and underpin the design and implementation of an intervention, and evaluate it appropriately. Norman et al (2000) stated that founding health intervention on social and behavioural theory increased the efficacy of an intervention, however in order for this to be the case, Bartholomew et al (2001) stated that theory must

be relevant, and applied appropriately. Bartholomew et al (2001) suggested that 'Intervention Mapping' would provide a framework of steps that would if followed, support the development of effective, evidence-based, health interventions, that were underpinned by appropriate theory. It was intended by the authors (Bartholomew et al, 2001), that Intervention Mapping should be viewed as a practical planning and development tool for health interventions, rather than being considered as a theoretical model. The five steps that comprised Intervention Mapping were: 1) Specification of the intervention goal into the intervention objectives i.e. learning what needs to change and how; 2) selecting theoretical methods and strategies to apply them to; 3) designing the intervention; 4) planning the implementation of the intervention, including setting up communication loop between the researcher and the participants; and 5) evaluation of the process and the effect of the intervention. In addition, Bartholomew et al (2001) stated that in order to utilise the Intervention Mapping protocol, a needs assessment must precede, including a review of the literature, in order to evaluate which theories may be appropriate and to gather general information related to the target health issue. This thesis will henceforth report the phases of this study in relation to the Intervention Mapping protocol (Bartholomew et al, 2001).

1.4 Thesis outline

This study conducted an extensive literature review in order to gather as comprehensive a view as possible of the contemporary research around pregnant women living with obesity, and GWG; including general theories that had been applied in other health promotion programmes. Although supporting the control of GWG in women living with obesity was a NICE central precept (NICE, 2012) the subject was in its infancy and therefore there was no

consistent and conclusive evidence for what worked, and community midwives reported a lack of confidence regarding their role supporting women living with obesity with managing their weight. Whilst studies have been conducted that implemented lifestyle interventions with pregnant women living with obesity; fewer had considered the role of community midwives in controlling GWG. In most pregnancies, community midwives have the greatest amount of contact with pregnant women living with obesity. A bond of trust was reported by both women and community midwives, and therefore an ideal opportunity existed to offer consistent support for a woman living with obesity who wished to control her GWG. A majority of the small amount of contemporary research that examined the role of health professionals in managing gestational weight, was not underpinned by any theory.

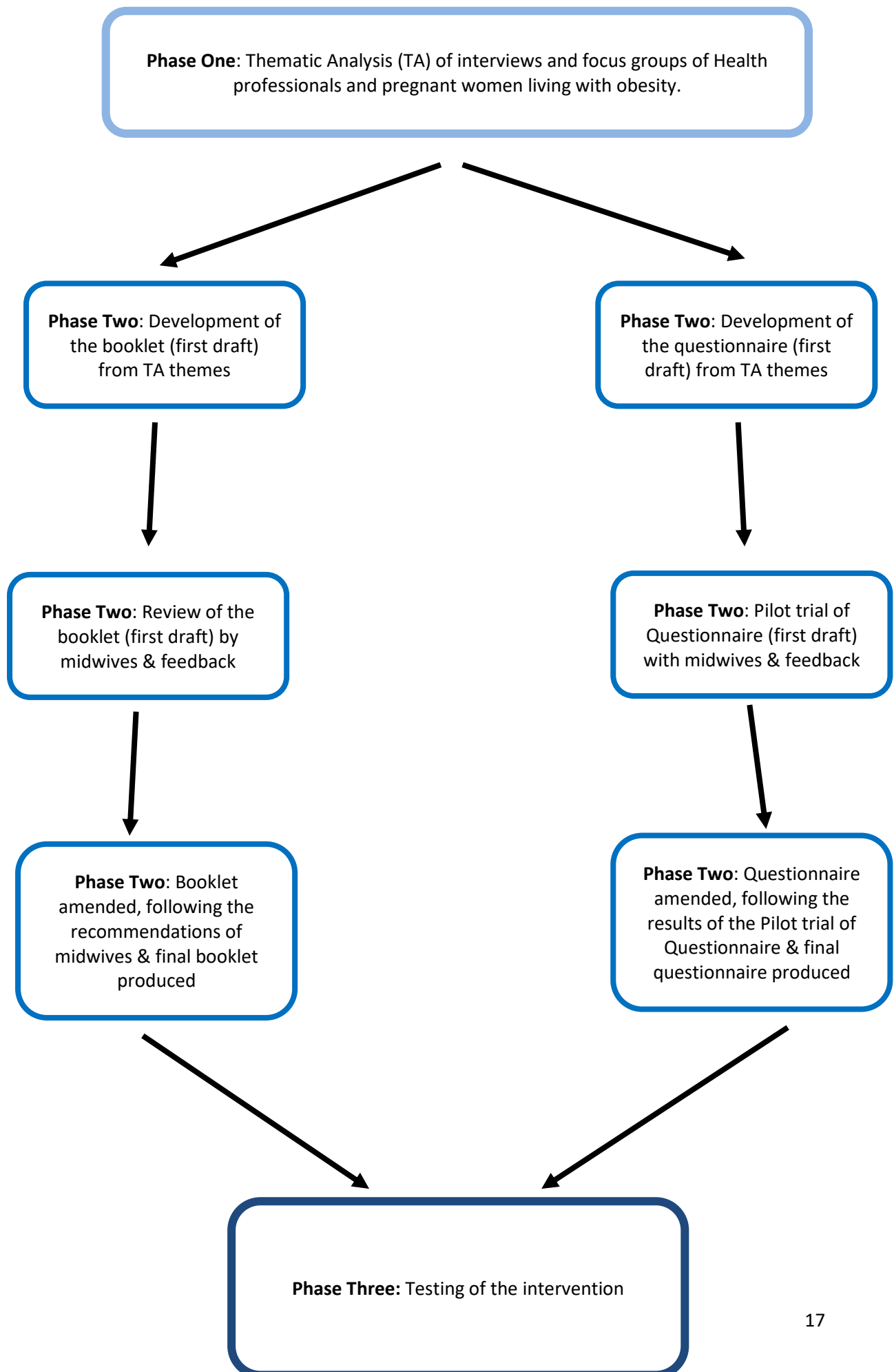
Having established that a gap in the literature existed, concerning theoretically-based health interventions for pregnant women living with obesity and their GWG; this study conducted a needs assessment, in order to gain a fuller picture of the issue of body weight and GWG, in pregnant women living with obesity. Information from this needs assessment then informed the design, the development, and the evaluation of the intervention. This study utilised a well-validated theoretical framework, the Theory of Planned Behaviour (TPB) (Ajzen, 1985) to elucidate the views and experiences of those most affected by obesity in pregnancy. The TPB was furthermore used to underpin an evaluation of this study's intervention, that was developed to facilitate the further involvement of community midwives in supporting the GWG of pregnant women living with obesity. Since correct application of the TPB required that data were gathered from the study population to inform the content of scales that assessed the effectiveness of any intervention; it grounded the study in the data of the participants.

This thesis is comprised of three distinct phases that formed the complete PhD study and therefore will be described here separately. Phase One (chapter four), was an in-depth, cross-sectional phase that described the experiences and views of the key people most affected by obesity in pregnancy; they being pregnant women living with obesity and health professionals involved in the maternity care of those women. In relation to the Bartholomew et al (2001) Intervention Mapping protocol, Phase One was a needs assessment, and met the criteria for steps 1 and 2 of the protocol, since the data from this phase were drawn upon to clarify the intervention objectives i.e. what needed to change and how; and to decide upon the strategies that would apply the theoretical framework (the TPB) to the research. The data from Phase One informed all aspects of the design of the Phases Two and Three of this study. In Phase Two (chapters five, six and seven), steps 3 and 4 of the Intervention Mapping protocol were fulfilled i.e. designing the intervention, and planning the implementation of the intervention, including setting up communication loop between the researcher and the participants. Phase Two concerned the development of the resource, the development of the research questionnaire and a pilot trial of the questionnaire in order to refine it. Phase Three, of this study, was the evaluation the intervention that aimed to facilitate the increased involvement of the health professionals most involved in maternity care, community midwives, in supporting the control of GWG in pregnant women living with obesity. In relation to Intervention Mapping, Phase Three (chapters eight and nine) of this study, met the criteria for step 5, that is, the evaluation of the process and the effect of the intervention

Chapter two has presented an examination of the literature concerning the current position of research, practice and policy surrounding the issue of obesity in pregnancy. Chapter three examined health promotion from the perspective of

Social Cognitive Theory (Bandura, 1986) and centred on the use of the TPB (Ajzen, 1985) in health behaviour research. This chapter discussed the application of the TPB to the health promotion behaviour of health professionals and the practice of community midwives. Issues such as time, knowledge and confidence of community midwives were considered. This chapter concluded with the research questions of this study. Chapter four described the in-depth, Phase One, needs assessment consultation and the intervention development based on Thematic Analysis (TA) (Braun et al, 2006) of the consultation data. Chapter five explained the development of the intervention tool i.e. the booklet for midwives. Chapter six concerned the development of the research instrument which was the TPB scale that was based on the TA of the consultation data. In chapter seven, the Pilot trial of the Questionnaire tested the scale described in chapter six and discussed the resulting changes to the instrument. This chapter also described changes to the intervention design which were a response to the organisational changes within the midwifery service that had occurred during the study period. Chapter eight presented the test of the intervention, and described the delivery of the intervention, the methods and the results. Finally, in chapter 9 has presented the discussion and critical evaluation of the study finishing with recommendations for future research and the unique contribution made to new knowledge by this study. A flowchart of the study's phases can be seen in Figure 1.

Figure 1.1: Flowchart of the study phases



1.5 Aims and objectives

Although this study was a single PhD project concerning facilitating midwifery involvement in supporting pregnant women living with obesity, with controlling their GWG; it was a project of three distinct phases. These three phases were: Phase One data gathering and consultation; Phase Two, the development of: the intervention, the questionnaire and the intervention tool, and Phase Three tested the intervention. As the developmental phase in between the 'sandwich' of data gathering phases, Phase Two did not produce any new data and therefore this study did not produce aims and objectives for this phase. Phases One and Three generated data from the research that was conducted. Phase One generated qualitative data which informed the development and testing of the intervention and Phase Three generated quantitative data, the results of the intervention testing. The aims and objectives of Phase One and Phase Three were therefore distinct and are presented here separately.

1.5.1 Phase One: Aims

The aims of Phase One were to build a comprehensive picture of the current state of affairs regarding obesity in pregnancy and controlling GWG in pregnant women living with obesity. Furthermore, to utilise this information to design and develop all aspects of an intervention intended to facilitate community midwifery involvement with supporting gestational weight management, in women identified as obese at the start of their pregnancy. Finally, this phase aimed to generate items from this data that would be used to inform the research instrument, a questionnaire based on the TPB, which was used for the analysis of Phase Three.

1.5.2 Phase One: Objectives

In order to achieve these aims, this phase:

- collected the views and experiences of pregnant women living with obesity, and health professionals involved in the maternity care of pregnant women living with obesity, by conducting semi-structured focus groups or interviews. This was used to inform the design of the intervention for Phase Three, the design of the resource for this intervention.
- generated items based on the emerging themes to create the questionnaire for testing Phase Three.

1.5.3 Phase Three: Aims

The aims of Phase Three were to deliver an intervention that facilitated community midwifery engagement with supporting pregnant women living with obesity, with controlling their GWG. This phase aimed to do this by providing a resource to community midwives that they utilised to support pregnant women living with obesity with managing their GWG.

1.5.4 Phase Three: Objectives

In order to achieve these aims, this phase:

- tested the resource that was designed and developed during Phase One, in an intervention with community midwives.
- made a comparison with community midwives who had not utilised the resource over the same time period, and examined whether use of the resource

increased the incidence of midwifery engagement with supporting GWG in women living with obesity.

Literature review

The literature review for this exploratory PhD study presents a general overview of the problems associated with obesity in pregnancy and maternity care for pregnant women living with obesity. A search was conducted in PubMed and Psych Info, using the MESH terms “interventions*behaviour-change*midwives*gestational*obese” and no literature was found that reported an intervention to change the behaviour of midwives in relation to their practice concerning obesity. This served to highlight that there was a gap in the literature concerning research into behaviour change for midwives with regards to supporting women living with obesity with gestational weight management.

Since there was no literature reporting this area of research, a systematic review of the topic was not possible and a general search was conducted to provide a broad background to this study's research area. If a systematic review had been conducted, this would have excluded literature that could potentially have supported the development of the intervention and guided the research. This literature review includes key systematic reviews that have been conducted around controlling gestational weight gain in pregnancy, however, the focus of these reviews concerns the behaviour of the women themselves rather than their midwives. Furthermore, qualitative papers are presented that reported the views and experiences of midwives, but they were not interventions to change the behaviour of those midwives. This literature review will henceforth present an overview of the situation concerning obesity in pregnancy, discussing global and national reports, relevant policies and research. An examination of the literature concerning the health outcomes for an obese mother and her child was conducted and literature regarding interventions to manage gestational weight

gain in women living with obesity, presented. Finally, the current NHS maternity service provision of weight management support for pregnant women living with obesity and the role of midwives as the frontline of maternity care in that support was reviewed. This breadth of literature underpinned and informed this exploratory study, in the absence of any existing literature that reported behaviour change intervention for midwives to facilitate their supporting pregnant women living with obesity, with their weight management.

The World Health Organisation (WHO, 2006) defined overweight and obesity as “abnormal or excessive fat accumulation that may impair health”. In 2006 WHO indicated that 1.6 billion adults worldwide were overweight and at least 400 million were obese. Determinants of overweight and obesity were the same globally and included biological, psychological and sociological factors; making a multidisciplinary approach essential for a global strategy for reducing obesity.

The global increase in overweight is reflected in the UK population. In 2014 the WHO published the latest statistics on overweight and obesity and 28.2% of the UK population are obese. The Health Survey for England (2016) reported that around 58% of the female population in the UK were overweight or obese and 27% are classified as obese. Women belonging to the second lowest quintile income had an obesity rate of 39% compared to those in the highest quintile income with 17% (NHS Digital, 2017). It seemed therefore that in a low-income area where there are high levels of unskilled workers; additional resources are needed to address this disparity. This demographic is reflected in the pregnant population and a BMI that exceeds “normal” increases risk to health and a poorer long-term prognosis for the child such as increased risk of obesity, dyslipidaemia, type 2 diabetes, elevated blood pressure, behavioural problems and risk of asthma (Godfrey et al, 2017; O'Reilly et al, 2013) (see section 2.3).

There are variations between nations in BMI cut off points for categories however for clarity this study will use the World Health Organisation's internationally agreed definition of obesity (WHO, 1995, 2000 & 2004) in table 1.1, as the research discussed in this literature review primarily concerns either research in a UK population or in populations that are similar to the UK population (economically and environmentally).

2.1 Obesity in pregnancy and pregnancy complications

Pregnant women with BMI above 'normal' are significantly more likely to experience pregnancy complications (Stubert et al 2018, Fuchs et al 2017, Irwin 2010, Seibre et al 2001, Cnattingus et al 1998). In 2010 the Centre for Maternal and Child Enquiries (CMACE) report "Maternal obesity in the UK: Findings from a national project" identified a direct link between maternal death and obesity. Key findings from the 3 year "Obesity in pregnancy" project were that pregnant women living with obesity were over-represented in the numbers of direct deaths and poor pregnancy outcomes and furthermore that those women in obesity class II and III were at proportionally greater risk of those things than overweight and obesity class I women (CMACE, 2010). The CMACE report also identified national and regional prevalence rates of maternal obesity and audited the maternity notes of women living with obesity against the CMACE/RCOG Joint Guideline on the management of women with obesity in pregnancy (2010). The report brought the complications surrounding obesity in pregnancy to the fore of maternity care.

A systematic review and meta-analyses examined the relationship between obesity class III (morbid obesity) women and maternal and neonatal health outcomes; compared with those outcomes for obesity class I and II women (Lutsiv et al, 2015). The study found that morbidly women living with obesity

were at increased risk of adverse maternal and neonatal outcomes including the primary study outcomes of large-for-gestational-age infants and pre-term birth, and the study's secondary outcomes of: pre-eclampsia, Gestational Diabetes Mellitus (GDM), Caesarean, ante and post-partum haemorrhage, longer hospital stay, lower infant Apgar score at 5 and 10 minutes, increased risk of infant admission to special care baby unit, and greater incidence of congenital birth defects. All findings were increased in the risk of adverse outcomes for class III women living with obesity when compared with class I women living with obesity, and for some outcomes, the risks were significantly increased when compared with both class I and II women living with obesity. Stubert et al (2018) reported an increased relative risk of GDM and pre-eclampsia according to increased pre-pregnancy BMI. Persson et al (2017) reported that fetal malformations were significantly correlated with the level of obesity in a cohort study of 1.2 million. Findings from these reviews and the analyses, therefore, offered this study a rationale for controlling GWG in pregnant women living with obesity in order to prevent them moving into a higher obesity class.

Santangeli et al (2015) reviewed the impact of maternal obesity on perinatal and childhood outcomes and recommended that lifestyle and pharmacological clinical interventions should be conducted in order to establish whether the adverse maternal and neonatal outcomes that they had reviewed, could be reduced. The increased risk of GDM and pre-eclampsia identified by Santangeli et al (2015) in women living with obesity, was suggested to negatively influence the intrauterine environment, and increase the likelihood of fetal macrosomia, leading to an increase in morbidity for both mother and neonate. A cohort study of $n = 6558$ pregnant women examining maternal obesity and maternal and neonatal outcomes supported the conclusions of the Lutsiv et al (2015) and Santangeli et al (2015) systematic reviews and meta-analyses; finding that

maternal obesity increased prevalence of GDM, pre-eclampsia, Caesarean and that neonates from women living with obesity had: a higher birth weight, increased prevalence of: macrosomia, admission to special care units, and lower 1 minute Apgar scores (Bautista-Castano et al, 2013). Neonates from both overweight and obese mothers were found to be at increased risk of macrosomia and maternal risks of GDM, pre-eclampsia and gestational hypertension were also found in both overweight and women living with obesity. Although reviews and analyses had found that adverse outcomes for both mother and infant increased proportionally with obesity class, increased risk for many adverse outcomes had been found in overweight women and therefore some justification existed for interventions that offered support for controlling GWG for all women whose weight class exceeds 'normal' at the start of their pregnancy. As a significant proportion of the UK reproductive-age women is overweight or obese, it could be suggested that developing resources for managing GWG is vital.

A systematic review and meta-analysis of observational studies from 1966-2008, with a record of pre-pregnancy or early pregnancy body weight or BMI, was conducted, reviewing data of congenital anomalies (Stothard et al, 2009). The odds ratios for fifteen sub-groups of congenital anomalies were calculated for different weight classifications (normal weight, overweight and obese), and increased odds of nine sub-groups of congenital anomalies (neural tube defects, Spina bifida, cleft palate, cleft lip and palate, hydrocephaly, anorectal atresia, limb reduction anomalies, septal anomalies and cardiovascular anomalies) were seen in women living with obesity compared to normal weight women (Stothard et al, 2009). Suggestions that were made by the authors regarding the potential mechanisms for the relationship between obesity and congenital anomalies, concerned: the increased difficulties in monitoring the pregnancy via ultrasound

scanning (and thereby fewer terminations for fetal anomaly), the increased likelihood of type 2 diabetes associated with obesity, and an established increased risk of congenital anomalies with maternal obesity, plus the possibility of increased nutritional deficiency associated with maternal obesity. It could be argued that since the associations between a wide range of congenital anomalies and maternal obesity were established by the use of the rigorous methodologies of systematic review and meta-analysis this study can, therefore, be considered robust evidence for the increased risk of congenital anomalies that obesity in pregnancy poses.

The increased risk of neural tube defects and other malformations in the offspring of women living with obesity are further complicated by difficulties in monitoring during pregnancy. A review of obstetric sonography analysed the data regarding the adverse effect that maternal obesity has on the detection of congenital anomalies (Weichert et al, 2011). Weichert et al (2011) identified that sonography was affected by excess abdominal fat which reduced the quality of the signal. The image quality of cardiac, cerebrospinal structures and umbilical cord were most affected by maternal obesity in addition to the already established reduction in image quality of the fetal organs. Recommendations were made that the additional challenges to obstetric sonography posed by maternal obesity should be addressed by the preparation of women living with obesity by counselling them of the potential for limitations in the capability of their ultrasound to make a diagnosis. Furthermore, Weichert et al (2011) recommended that only experienced sonographers should deliver the 20-week anomaly scan and increased the duration of the scan. A prospective study was conducted to examine the scan quality of $n = 223$ obese and $n = 60$ normal weight women attending a routine second trimester ultrasound scan between 2009 – 2011 in a single tertiary care centre (Fuchs et al, 2013), and supported

the findings of the review conducted by Weichert et al (2011). Although manipulation of the fetus (so that its back was in an improved position for sonography). Allowing additional time for scanning and using experienced sonographers, improved ultrasound success rate, however, the image quality was nevertheless significantly poorer in the women living with obesity than in the normal weight women.

A 2015 review of the relationship between obesity and stillbirth suggested that because maternal obesity significantly increases the risk of stillbirth, and additionally poses difficulties in monitoring the well-being of the fetus, those obese pregnant women should receive consultant led care (Woolner et al, 2015). Woolner et al (2015) reported that a pre-pregnancy BMI of ≥ 30 increased risk of stillbirth compared to normal weight women and that this rises proportionally alongside obesity class, with super-obesity (BMI ≥ 50), posing a 5.7 times increased risk of stillbirth (compared with normal weight women) at 39 weeks, and 13.6 times at 41 weeks. Although higher classes of obesity demonstrated a significant relationship with an increase in the prevalence of stillbirth, Woolner et al (2015) discouraged extreme changes to diet or weight and recommended that further evaluations of the safety and efficacy of interventions for the reduction of obesity in pregnancy, should be conducted.

A retrospective cohort study of over 2.8 million singleton births in Washington and Texas established a positive relationship between increasing weight classification and an increase in the risk of stillbirth (Yao et al, 2014). When compared with normal weight women, stillbirth was 1.7 times more likely to occur in obese class I women, 2 times in class II, 2.48 in class III, and 3.16 in women living with obesity with a BMI ≥ 50 (Yao et al, 2014). Furthermore, associations between excessive BMI and stillbirth were found to be most

significant at early and late pregnancy. As there is a significant association between increasing obesity class and increasing prevalence of stillbirth there is an incentive for managing GWG in pregnant women living with obesity in order to forestall moving up through obesity classes.

As previously discussed in this chapter, GDM has an established relationship with a range of adverse neonatal outcomes such as: macrosomia, large-for-gestational-age infants, increased risk of congenital anomalies and increased risk of stillbirth (Stubert et al, 2018; Santangeli et al, 2015; Stothard et al, 2009). Maternal obesity was directly associated with gestational diabetes (Hyperglycaemia and Adverse Pregnancy Outcomes Study Cooperative Research Group (HAPO), 2010), and gestational diabetes was found to have a significant association with an increased incidence of type 2 diabetes within 5 years postnatally (Kim et al, 2002). This systematic review of the literature published 1965 - 2001 that concerned the relationship between GDM and postnatal type 2 diabetes found that women with the greatest pregnancy glucose levels had the greatest risk of developing type 2 diabetes after delivery. Kim et al (2002) suggested that increasing frequency of postnatal screening for diabetes and offering preventative lifestyle intervention may reduce the likelihood of developing type 2 diabetes. Despite the recommendation for increased frequency of postnatal testing for type 2 diabetes made by the aforementioned systematic review, and the recommendation for annual screening for women who had a diagnosis of GDM made by NICE guidelines (2008), a retrospective cohort study of women over a 5 year period reported that the monitoring of women after GDM was suboptimal (McGovern, 2014). Regional variances were found in the monitoring of women and McGovern et al (2014) suggested that since early detection could improve health outcomes with lifestyle and/or pharmacological intervention, and that it was imperative that women with a

diagnosis of GDM received long-term diabetes screening. Lifestyle changes may help to reduce excessive weight gain and the reduction of excessive weight gain may help to reduce the incidence of type 2 diabetes. It could, therefore, be suggested that lifestyle changes appropriate to pregnancy could be made to encourage the reduction in the incidence of GDM in pregnant women living with obesity.

Santangeli et al (2015) reported an increased risk of pre-eclampsia in obese mothers in a review of 16 studies of women stratified by pre-pregnancy BMI and Scott-Pillai et al (2013) reported increased odds (OR) of hypertensive disorders when compared with normal weight women that increased in parallel with obesity class (class I OR 3.5; class II OR 5.0; class III OR 6.6) in a retrospective study of 30, 298 singleton pregnancies in Northern Ireland. Bautista-Castano et al (2013) also studied 6,558 pregnant women and reported increased relative risk (RR) in women living with obesity when compared with normal weight women of hypertension (RR 4.79), and pre-eclampsia (RR 8.8), when adjusted for maternal age, socio-economic status, smoking and number of pregnancies. Macdonald-Wallis et al (2013) conducted a repeated measure, longitudinal study where 12, 522 women were measured for antenatal weight (median 12 times) and blood pressure (median 14 times) and found that GWG was a significant independent predictor of gestational hypertension. Whilst greater pre-pregnancy weight was also an independent predictor of gestational hypertension, the effect of excessive GWG in early pregnancy independently predicted an increase in blood pressure in the later stages of that pregnancy. It could be suggested that the influence of pre-pregnancy BMI ≥ 30 when accompanied by excessive GWG during early pregnancy would significantly increase the likelihood of gestational hypertensive disorders, and therefore managing GWG in early pregnancy could

conversely contribute to the reduced risk of gestational hypertension in pregnant women living with obesity, and improve maternal health.

Whilst the increased risks to maternal and fetal health associated with maternal obesity were major concerns during pregnancy, Denison et al (2009) noted that the majority of reporting on complications related to maternal obesity focused on major morbidities however, women living with obesity were also at increased risk of minor complications. A significant increase in the reporting of chest infection, heartburn and symphysis-pubis dysfunction were associated with increasing BMI, with again the greatest reporting in the obese category BMI ≥ 30 . Denison et al (2009) argued that there was a significant cost to the National Health Service of treating minor complications of pregnancy that also increased with increasing BMI category. The treatment of women in the highest BMI category (BMI ≥ 30), cost over £30 per person more than women in the normal weight BMI category (BMI < 25). It, therefore, could be suggested that even if obese pregnant women do not develop major morbidities during pregnancy that are associated with raised BMI there may still be health complications. This can place an additional financial burden on the NHS and therefore gestational weight control strategies may be beneficial for managing minor complications in pregnancy. Morgan et al (2015) reported a strong association between healthcare cost during pregnancy and BMI after controlling for maternal age, parity, ethnicity and any comorbidity, in a retrospective analysis of the health service records of 484 singleton pregnancies. Health services costs of women living with obesity were 37% greater than those of normal weight women costing an average of £4717 for an obese woman, compared with £3546 for a normal weight woman. The increasing direct and indirect costs to the NHS of obesity are echoed in the increased cost of maternity healthcare for pregnant women living with obesity.

Calik et al (2018) studied the maternal and neonatal outcomes of 698 women with singleton pregnancies, recording BMI from the first trimester. In women with BMIs in the overweight and obese categories, the prevalence of maternal and neonatal complications was significantly higher. Women with a raised BMI were more likely to have longer labours and require induction, instrumental delivery, episiotomy, and caesarean delivery. Furthermore, the newborns of women with a raised BMI were more likely to be admitted to neonatal intensive care, have a lower Apgar score, and be macrosomic. The rate of caesarean/complicated delivery and admission to neonatal intensive care increased in relation to pre-pregnancy BMI, and GWG.

Hancke et al (2015) noted that obstetric complications such as gestational diabetes, pre-eclampsia, caesarean and pre-term birth were associated with the pre-pregnancy obesity of the mother in a retrospective analysis of maternal and neonatal outcomes of 12, 330 women. Subgroup analyses of women living with obesity stratified into class I, II and III obese were conducted and the increased risk of adverse outcomes increased with rising obesity. It could be suggested therefore that raising the issue of raised BMI at the earliest opportunity is important for facilitating optimum maternity care. Furthermore, it could be argued that for women who have not already sought to address reducing their BMI at the pre-conceptual stage; that the antenatal booking appointment would be an opportune time for discussing controlling GWG to reduce the risk of obstetric complications and optimise outcomes for mother and child. However, research by Arrish et al (2016); and Olander et al (2011) suggested that health professionals were unsure about what advice to give about managing GWG, concerns about giving incorrect information and a perceived lack of time. An exploration of midwives' perspectives of their training and education requirements in maternal obesity identified that any interventions developed to

address maternal obesity should take into consideration the need to support midwives to overcome the barriers to practice that are presented by maternal obesity (Heslehurst et al, 2013). There were commonalities in the findings of Olander et al (2011) and Heslehurst et al (2013), who identified the need for training for health professionals/midwives to increase knowledge regarding gestational weight gain. Furthermore, both studies suggested training in communicating about gestational weight gain, to increase confidence so that they may feel able to discuss weight gain in a sensitive manner. In a thematic analysis of midwives and pregnant women Holton et al (2017) identified inconsistent weighing practices as one of the key themes of their study. Heslehurst et al (2013) and Olander et al (2011) furthermore reported that health professionals and midwives said that not weighing women throughout their pregnancy made it challenging to provide weight appropriate feedback and recommendations, and therefore being able to weigh women throughout their pregnancy would provide that opportunity. Olander et al (2011) noted that health professionals reported a lack of time as a factor in their decision as to whether they discussed gestational weight gain with women or not. Olander et al (2011) suggested that increasing the knowledge and confidence of health professionals/midwives to discuss gestational weight gain with women, would increase the engagement of health professionals/midwives with supporting appropriate gestational weight gain. Othman et al (2018) conducted a systematic review of the literature concerning the knowledge and confidence of midwives concerning healthy eating in pregnancy. Othman et al (2018) stated that sufficient evidence existed to provide a rationale for developing and testing an education programme for midwives to increase knowledge, understanding and confidence in order to enhance the healthy eating support that they give to pregnant women. This may then, in turn, bring an awareness of the importance

of managing GWG to the fore for pregnant women and increase their motivation to manage their weight gain.

2.1.1 Excessive maternal weight gain during pregnancy

There are presently no UK guidelines concerning recommended gestational weight gain however the IOM and NRC (2009) guidelines are often referred to in UK healthcare. A systematic review of the outcomes of maternal weight gain identified that women who gain weight during pregnancy outside of the IOM & NRC (2009) recommended ranges (table 2.1) were at increased risk of hypertension, including pre-eclampsia, gestational diabetes, labour and delivery complications, and postnatal weight retention, leading to a higher weight status for later pregnancies (Siega-Riz et al, 2009).

Table 2.1: New Recommendations for total and rate of weight gain during pregnancy, by prepregnancy BMI

Prepregnancy BMI	Total weight gain	Rate of weight gain in 2 nd – 3 rd trimester
	Range (kg)	Mean range (kg/week)
Underweight (<18.5kg/m ²)	12.5 -18	0.51 (0.44 - 0.58)
Normal weight (18.5-24.9kg/m ²)	11.5 - 16	0.42 (0.35 – 0.50)
Overweight (25-29.9kg/m ²)	7 – 11.5	0.28 (0.23 – 0.33)
Obese (≥30kg/m ²)	5 – 9	0.22 (0.17 – 0.27)

Source: Institute of Medicine (US) & National Research Council (US), 2009.

Women who enter pregnancy overweight or obese are already at increased risk of complications, therefore, increased postnatal weight retention sets up a cycle of risk (IOM & NRC 2009). Bhavadharini et al (2017) examined retrospective records of 2728 women and found that overweight and obese women who gained more than the IOM & NRC (2009) recommended GWG, were at increased risk of pre-eclampsia, pre-term birth, caesarean delivery and macrosomic infants. Similarly, pregnant women with type 2 gestational diabetes

mellitus (GDM) who gained above the IOM & NRC (2009) guidelines were found to be at increased risk of large for gestational age (LGA) and macrosomic infants, pre-term birth, and caesarean birth (Yee et al, 2011). Hernandez et al (2007) detailed the relative risk of perinatal morbidities according to weight category in their retrospective review of all women living with obesity who received antenatal care at their institution over a five-year period (2000-2005) $n=19,728$. Table 2.2 displays outcomes by BMI groups of women who gained excessive gestational weight according to IOM and NRC (2009) guidelines. Women living with obesity who gained excessive gestational weight did not demonstrate a significantly increased risk of infants with low birth weight, very low birth weight or low Apgar score, however, all other morbidities were significantly increased in women living with obesity who exceeded IOM and NRC (2009) recommendations for weight gain (Hernandez et al, 2007).

Table 2.2: Pregnancy outcomes by BMI group

Outcome %	Class I	Class II	Class III	P Value
Pre-eclampsia	4.8	6.3	8.9	<0.001
GDM	4.9	7.7	10.4	<0.001
Caesarean delivery	41.4	52.7	62.2	<0.001
Pre-term delivery	12.5	14.5	14.8	<0.01
Macrosomia	1.9	3.2	5.4	<0.001
Neonatal ICU	17.1	19.2	21.3	<0.01

Source: Hernandez et al (2007)

Pre-pregnancy obesity coupled with excessive gestational weight has the potential to increase enhanced maternity care for some pregnant, women living with obesity. Although Hernandez et al (2007) reported US data, it was expected that findings would be similar in the UK. Demographically the US and UK are similar, both with very high Gross Domestic Products (GDP) and similar average duration of education (12 years US; 13 years UK). Furthermore, there were similar rates of growth in overweight and obesity in the US and the UK measured since 1990 (Institute for Health Metrics and Evaluation, 2016).

Factors such as education, economy, and cultural similarities coupled with the similarity in the growth rate of overweight and obesity suggested that the findings similar to those of Hernandez et al (2007) were likely to be found in the UK population.

2.2 Obesity in pregnancy and long-term maternal health

The most catastrophic outcome of maternal obesity is a threat to life. The CEMACH Maternal Death Enquiry (2000-2002) found that 35% of women ($n = 136$) who died were obese (CEMACH, 2004). The CMACE report 2006-2008 highlighted that obesity remained a significant contributor to maternal death and women living with obesity were over-represented in maternal death (Cantwell et al, 2011). The consequences of maternal obesity may, therefore, have a profound effect on the mother and her family.

A high pre-pregnancy BMI was associated with increased long-term risk of diseases in a retrospective cohort study of 13,608 women (Moll et al, 2017). Moll et al (2017) reported that the combined effect of high pre-pregnancy BMI and high GWG increased the risk of diabetes by up to six times, compared with women of normal weight. High BMI, high GWG women were also twice as likely to develop cardiac and endocrine diseases over the long term.

In a 21-year post-partum follow-up study of 2026 women who were stratified into normal weight, overweight and obese weight classes found that women who exceeded the IOM and NRC (2009) recommendations for GWG were at increased risk of being overweight or obese, in the long-term post-natally, and this association was strengthened when Prepregnancy BMI was adjusted for (Mamun et al 2010). It could be suggested that for women who were obese pre-pregnancy, failed to lose pregnancy weight and therefore a sustained increase in their BMI increased their risk for future pregnancies. Amorim et al (2007)

identified that excessive GWG was independently associated with raised BMI 15 years after the birth, after controlling for potentially confounding variables, including pre-pregnancy BMI. Chin et al (2010) found that GWG during a first pregnancy was repeated during subsequent pregnancies and identified that excessive GWG during first pregnancy was a significant risk factor for a raised BMI going into a second pregnancy. Since obstetric complications and suboptimal pregnancy outcomes increase in relation to increasing BMI with the greatest risk being seen in the highest BMI categories; it could, therefore, be suggested that controlling GWG not only serves to reduce risk in the short term but has longer-term implications for future pregnancies, and the long-term health of the mother. It can consequently be argued that successful strategies and resources for use by health professionals which are developed to support pregnant women living with obesity with controlling their GWG could be deployed more widely to support any pregnant woman in achieving their optimum GWG.

2.3 Obesity in pregnancy and the health of her offspring

A systematic review and meta-analysis of pre-pregnancy obesity and child neurodevelopmental outcomes found that children born to women who were obese at the start of their pregnancy were at increased risk of neurodevelopmental compromise (Sanchez et al, 2018). The review found that the offspring of obese mothers were at significantly increased risk of Autistic Spectrum Disorders (ASD), Attention Deficit Hyperactivity Disorders (ADHD), behavioural or emotional issues, and developmental delay. Godfrey et al (2017) argued for the significant effect of maternal obesity on risks to the long-term health of her offspring. The review of observational studies found that maternal obesity may influence the development of obesity, asthma, type 2 diabetes,

coronary heart disease (CHD), stroke and poorer cognitive function of her child. Ensenaur et al (2013) retrospectively examined the data of 6837 mothers and their single offspring, including the body measurements of the offspring at their entry into school. Using the IOM and NRC (2009) recommendations for BMI specific GWG, Ensenaur et al (2013) identified a significant relationship between excessive maternal GWG and offspring obesity and central adiposity. Olson (2012) reviewed maternal obesity and the implications for future generations and noted that there was an increasing body of evidence for a causal relationship between maternal obesity and offspring obesity, coupled with a linear association between GWG and childhood obesity. Schack-Nielsen et al (2010) identified a positive relationship between GWG and the BMI of offspring at all ages through childhood and adulthood. In a prospective birth cohort study that collected information about 4234 offspring born between 1959 and 1961 and their mothers, final data were collected for 2485 offspring at 42 years old. Regression analyses indicated that greater GWG was associated with increased BMI in the offspring and increased risk of obesity with the highest GWG ($\geq 16\text{kg}$) showing a 2.36-fold increase in offspring obesity compared to the lowest GWG ($< 6\text{kg}$) (Schack-Nielsen et al, 2010).

A multi-ethnic study which examined data retrospectively from 10, 226 individuals, from 12 sites across the United States, found a positive relationship between GWG and overweight offspring at 7 years old; with the odds increasing 3% per 1kg of GWG exceeding IOM recommendations (Wrotniak, 2008). The offspring of children whose mothers had gained more weight than the IOM's (2009) recommendations were 48% more likely to be overweight than those whose mothers stayed within the recommendations. Furthermore, the greatest risk for overweight offspring was in the highest pre-pregnancy BMI category (> 29) who had also exceeded the recommendations for GWG. Whilst this study

used self-reported pre-pregnancy weight for the calculations it was likely that self-report bias was minimised as the original purpose for the data collection was not for a weight study but a study looking at other health outcomes. Similarly, whilst the study did not examine the relationship between obesity in pregnancy and offspring outcomes specifically; analysis of the data indicated that the strongest relationship between overweight offspring and GWG was seen in the maternal BMI >29 (obese) category.

An increase in childhood obesity has been associated with an increase in glucose tolerance, hyperglycaemia and metabolic syndrome. A longitudinal risk study of 506 children who were screened at 12- 13 years of age in 1977, re-examined and re-screened the children 35 years later, in 2012. Significant correlations between childhood BMI, childhood skinfold thickness and adult hyperglycaemia, diabetes, and adult metabolic syndrome were found (Petkeviciene et al, 2015). A retrospective cohort study of 244, 464 children aged between 7 – 13 (born between 1930-1989) was conducted to examine the relationship between childhood BMI and Non-Alcoholic Fatty Liver Disease (NAFLD) and a significant association between the childhood BMI and the increase in BMI in adulthood (Zimmerman et al, 2015). Obesity was tracked from birth into adulthood (Eriksson et al, 2003), and excessive GWG was found to be a predictor of offspring childhood obesity (Lau et al, 2014). It could therefore be argued that not only did a proportion of obese children display early indicators of conditions such as insulin resistance, but that even for obese children who did not have the early markers of obesity-related conditions during childhood, they were more likely than normal-weight children to suffer from the chronic conditions associated with obesity during their lifetime.

2.4 The Public Health Cost

Obesity has wide social and economic impacts including increased sickness absence, increased demands on social care. Obese individuals were 3 times more likely to rely on social care, less likely to be employed and more likely to be hospitalised in a 2013 report on trends in adult obesity. Furthermore, the greater the level of deprivation, the greater the incidence of maternal obesity with the greatest increase in the most deprived sectors of society (Public Health England, 2013). The inequality in the distribution of maternal obesity and its associated public health consequences serves to illustrate the complexity of calculating the public health cost in the UK. Health Matters: obesity and the food environment guidance, estimated the costs of obesity to the NHS in 2014-2015 at £6.1bn, and the wider cost to the society at £27bn. The guidance projected that by the year 2050 these costs will have risen to £9.7 billion to the NHS, and £49.9 billion wider cost to wider society (Public Health England, 2017).

It is difficult to quantify the exact cost to public health of obesity in pregnancy. The non-direct costs of obesity in pregnancy are complex as a result of: increased demand on services, increased treatment costs for the co-morbidities of obesity both major and minor and the potential ongoing lifetime costs of offspring who are more likely to be born with birth defects, are more likely to develop insulin resistance and other conditions and are more likely to become overweight or obese themselves. Heslehurst et al (2010) stated that maternal obesity had more than doubled in less than 20 years in the UK and Morgan et al (2015) calculated a 37% increase in the cost of maternity care when compared with the maternity care of normal weight women, which is an increased cost of £1171.34 per person. Morgan et al (2015) suggested therefore that any

intervention to reduce the health care usage of obese pregnant women which cost less than that sum could be considered cost-effective.

2.5 Global Call for Action

The WHO convened in 1997 to recognise the emerging global epidemic that was obesity and to gather epidemiological information for developing strategy and policy to address the problem in a globally cohesive approach. The resulting report 'Obesity: Preventing and Managing the Global Epidemic' (WHO, 2000) stated that obesity was overtaking undernutrition and infectious disease as a direct contributor to ill health whilst also increasing the risk to other chronic diseases such as heart disease and cancer. Themes of the report centred on the preventability of obesity through changes to lifestyle and the chronic complexity of the obesity problem. The report stated that prevention and management were inextricably linked, and approaches to prevention and management of obesity must be integrated through all sectors of society.

In May 2004, the WHO adopted the 'Global Strategy on Diet, Physical Activity and Health' with the agenda of implementing a strategy to substantially reduce death and non-communicable disease through diet and physical activity. The four core objectives were: to reduce non-communicable disease risk factors through public health action; to increase public understanding of the effect of diet and physical activity; to encourage the sustainable development of policies and plans to improved diet and physical activity and to support research into diet and physical activity including evaluation of interventions and the resources needed to sustain them. A key principle of the Global Strategy was to take a 'life-course perspective' starting with maternal health and prenatal nutrition. WHO (2004) suggest that research evaluating policies and interventions should

be promoted and that the increased presence of behavioural science in the field should contribute to the development of both local and national expertise.

2.6 UK Policy and Guidelines

The Foresight Report 'Tackling Obesities: Future Choices' (Government Office for Science, 2007) laid out a comprehensive long-term strategy to deal with obesity in the UK over 40 years. McPherson et al (2007) suggested that by 2050 the majority of people Britain could be obese, and would have had a marked impact on government, research, business and other organisations (Foresight, Government Office for Science, 2012). In 2017, Health Matters: obesity and the food environment, guidance was released and made a call to action to the public, private and voluntary sectors, to collaborate in influencing the food environment to make healthier food choices available and accessible and affordable (Public Health England 2017). In 2018, NICE released Obesity: working with local communities, pathway. NICE (2018) advice included training and development for health professionals, for all partners, and for local services and resources, alongside coordinating local action and integrated commissioning of services. Tackling obesity at all levels, the individual, the community, the organisation, the institution, and central governance remains a national priority.

Barker (2007) and Singhal et al (2007) stated that the risks of obesity started at the earliest stage in life and therefore a life course perspective on tackling obesity should be taken (Government Office for Science, 2007). Based on the findings of the Foresight Report, the UK government set itself a target for action to reduce the proportion of overweight and obese children to 2000 levels by the year 2020 in the Healthy Weight, Healthy Lives publication (Department of Health, 2008). The Cross-Government Strategy for England 'Healthy Lives, Healthy People: A Call to Action on Obesity in England (Department of Health,

2011) stated that early-identification of at-risk families should include assessment by the twelfth week of pregnancy to identify mothers who are obese or overweight and to offer them advice about healthy weight gain in pregnancy and how this would impact on their pregnancy outcomes. Furthermore, personalised care for overweight and obese individuals should be available to help people reduce their BMI with increased responsibility given to the NHS for providing advice on and access to weight management services.

In 2015, Public Health England published findings from the Global Burden of Disease (GBD) 2013 study which identified that whilst life expectancy had increased in England, people were living longer with greater population levels of disease (Public Health England, 2015). The study identified that 40% of ill health could be explained by preventable risk factors and the two largest contributors were unhealthy diet and smoking (10.8% and 10.7% respectively). The report suggested that local and national action should be taken to address preventable illness and support healthy behaviours (Public Health England, 2015). In 2015, therefore, the UK government had identified targeting unhealthy eating as part of a larger drive to support healthy behaviour in England in order to tackle preventable illness.

The National Institute for Health and Clinical Excellence (NICE, 2010) guidance (PH27) on 'Weight management before, during and after pregnancy' made recommendation that weight loss should not be attempted during pregnancy as it may jeopardise the health of the unborn child. Guideline 3.9 noted that restrictive diets may increase ketone levels and affect the fetus' neuro-cognitive development (NICE, 2010). The guidelines stated however that pregnant women should be provided with the opportunity to discuss their diet and physical activity levels during their first visit to a health professional. Furthermore, obese

pregnant women (those with a pre-pregnancy BMI ≥ 30 ,) should be given advice related to healthy diet and activity levels and information about how diet and physical activity will benefit them and their unborn child. NICE (2012) stated that women living with obesity should also have the opportunity for referral to a dietitian (or another health professional) for further advice.

Similarly, the Centre for Maternal and Child Enquiries/Royal College of Obstetricians and Gynaecologists Joint Guideline (CMACE/RJOG), 'Management of Women with Obesity in Pregnancy' (CMACE, 2010) recommend that all obese pregnant women should be given information related to the risks of obesity in pregnancy and their minimisation and offered dietary and lifestyle advice. In relation to maternal obesity and maternal nutrition, recommendations were also made regarding the provision of specialist education and training for health professionals involved in the care of pregnant women. Both NICE (2012) and CMACE/RCOG (2010) recommendations highlighted the importance of pre-pregnancy, pre-natal and post-natal dietary and lifestyle on the short and long-term health of the mother and child. The NICE Quality Standard for Antenatal Care (2012) clarified pathways for the treatment of pregnant women living with obesity which included a recommendation for all women with a BMI ≥ 30 to be offered a referral to a dietitian.

2.7 Dietary Advice

The WHO Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020, objective 3, declared a halt in the rise of obesity and diabetes as a voluntary global target (WHO, 2013). A life course approach formed one of the overarching principles of the Action Plan and the implementation of the WHO Global Strategy on Diet Physical Activity and Health

(2004) was reaffirmed within the Action Plan to “create health and nutrition promoting environments including through nutrition education in schools, child care centres...clinics and hospitals...” (WHO, 2013, 33). The WHO Global Strategy on Diet, Physical Activity and Health (2004) was a seminal publication formulated by the member states of the WHO to address the rise of chronic, non-communicable disease globally and influences policy, guidance and practice concerning this. The Global Strategy (2004) recommended limiting energy intake from fats and saturated fats, increasing consumption of fruit, vegetables, whole grains and nuts and limiting intake of salt and sugars for a healthy diet for the general population. NICE (2010) made dietary recommendations for women before, during and after pregnancy, informed by the WHO guidance for healthy eating. Whilst it was not recommended for pregnant women to attempt losing weight during their pregnancy, it was recommended that a healthy diet and physical activity could help weight management (and assist women to not exceed recommended GWG) and may, therefore, help to reduce the risk of pregnancy and birth complications, and the risk to maternal and fetal health (NICE, 2010).

Pereira et al (2015) found that consuming low GI meals for a 45 day period was effective in reducing waist circumference and body fat, in a non-pregnant population when compared. A systematic review of low glycaemic index (GI) or low glycaemic load (GL) diets for overweight and obesity in the general population found that GI/GL diets were significantly more effective in decreasing body mass and body mass index in overweight and obese populations than any other kind of diet, with no report of adverse effects (Thomas et al. 2007). The glycaemic index (GI) of foods concerns their effect on blood sugar and a low GI diet aims to minimise variations in blood glucose level. By consuming foods with a low GI, these foods are absorbed and metabolised more slowly than higher GI

foods and therefore cause a slower and smaller rise in blood sugar. Glycemic Load is a calculation that uses the Glycemic Index of foods combined with the amount of carbohydrate that food contains, in order to work out how different portion sizes of different foods compare with each other, with regards to how they affect blood glucose (Glycemic Index Foundation, 2015). A meta-analysis of GI and chronic disease risk reviewed of over 40,000 incident cases and found that a high GI diet was significantly associated with an increased risk of a number of chronic diseases including type 2 diabetes, chronic heart disease (CHD) and breast cancer (Barclay et al, 2008).

In a randomised control intervention, the ROLO intervention (Randomized cOntrol intervention of LOw glycaemic index diet to prevent macrosomia in euglycemic women) found that women in their intervention group who were following low GI diet advice were less likely to gain weight which exceeded IOM and NRC (2009) recommendations than those in the control group who were not following a low GI diet (McGowan et al, 2013). Furthermore, the aim of the GI/GL diet to stabilise blood glucose could also be viewed as favourable for women living with obesity with GDM. A systematic review of the literature concerning glycaemic index and pregnancy found that a low GI diet may be able to reduce a need for insulin without negatively impacting on the pregnancy (Louie et al, 2010). This systematic review also stated that there was insufficient evidence currently to recommend replacing a normal healthy pregnancy diet with a low GI diet in a 'normal' pregnancy where a woman has not developed GDM. Furthermore, Markovic et al (2015) found that in a group of 139 intensively monitored normal-weight women there were no significant differences in pregnancy outcomes between the low GI diet group and the "high fibre healthy" pregnancy diet. The literature reviewed suggested that the key component of GI/GL eating i.e. managing intake of highly refined and quickly

absorbed carbohydrates had known benefits for both pregnant women and the general population. Whilst the benefits of controlling intake of high Glycemic Index (GI) foods in pregnancy are known, utilising a Glycemic Load (GL) diet as an intervention to deliver to pregnant women living with obesity was beyond the scope of this research. The difference between GI and GL is that GI is an index of the rate at which a carbohydrate is digested and released as glucose into the bloodstream, whereas GL takes into account the amount of carbohydrate that is contained with a 'serving' of a food. It would, therefore, be possible for a food to have a high GI but a low GL, simply because although the GI index for that food is high, the serving size is sufficiently small that the amount of glucose that is released into the bloodstream is actually small (Glycemic Index Foundation, 2015). NHS dietitians are trained and expert in delivering a GL diet to pregnant women living with obesity, whilst this study's researcher was not. In this study's NHS trust, women who have developed GDM were referred to an NHS dietitian and would attend the specialist diabetic clinic, where they would receive tailored advice. This research sought to facilitate midwifery involvement in offering support to obese pregnant women with weight management, at a level that was feasible within their role as a community midwife. Whilst this study did not deliver a GL intervention, the key component of GI/GL principles were utilised in the materials/resource that midwives used to support women living with obesity with managing their GWG. This simplification of the GL diet was an aspect of the resource used by the intervention group midwives, to support pregnant women living with obesity who had not been referred to the NHS, GDM dietetic clinic, thereby drawing on the benefits of controlling the intake of high GI food for all pregnant women living with obesity.

2.8 Dietary interventions in a pregnant population

A systematic review of dietary advice interventions for preventing GDM examined 11 trials, involving 2786 women and their infants reported very low, or low-quality evidence in 9 of the trials (Tieu et al, (2017). There was some evidence of a reduction of GDM in women receiving a dietary advice intervention when compared with those who didn't, and no difference found between high GI versus low GI dietary advice. Tieu et al (2017) suggested that further reviews should be conducted in order to gain further insight into the efficacy of intervention for reduction of GDM.

In 2010 a comprehensive systematic review of dietary and/or physical activity interventions for controlling weight gain in pregnancy was produced by the ScHARR Public Health Collaborating Centre (Campbell et al, 2010). Key to the public health guidance for promoting weight management in pregnancy (NICE, 2010) this extensive review of the literature found few studies that appraised the effectiveness of dietary and/or physical exercise intervention on gestational weight management and those included indicated inconsistent and inconclusive findings (Campbell et al, 2010). A subsequent systematic review of interventions to reduce or prevent obesity in pregnant women (Thangaratinam et al 2012) found that dietary interventions were most effective at managing GWG and reducing risk of hypertension, pre-eclampsia and shoulder dystocia, however, the researchers reported that the quality of evidence for all the interventions that looked at pregnancy outcomes was graded by their study as very low to moderate (Thangaratinam et al, 2012). Similarly, Lamminpaa et al (2017) conducted a systematic review of the literature concerning dietary interventions and gestational weight gain and GDM in pregnancy. Although significant differences between control and intervention groups were reported in

ten of the studies that they reviewed, again the huge variability of intervention strategy and low graded evidence, prevented any conclusions about what constituted an effective dietary intervention.

A large-scale meta-analysis of individual participant data from randomised control trials, examined the data of 12 526 women, for the effect of dietary and physical activity interventions on gestational weight gain and pregnancy outcomes (the International Weight Management in Pregnancy Group (WiP), 2017). The analysis found a significant main effect of the intervention on controlling GWG, and reduction of risk of caesarean delivery, however, no significant effect on any of the other pregnancy outcomes was seen. Although no statistically significant effects were seen on other pregnancy outcomes, the direction of the effect on these outcomes suggested some positive effect of the intervention.

A study that examined both the control of GWG and mental health outcomes (specifically trait anxiety) in pregnant women living with obesity found that participants from both of their intervention groups (one intervention group received a nutritional advice/physical activity brochure plus face-to-face sessions and the other intervention group received just the brochure) significantly reduced their GWG compared with the control (routine antenatal care) group (Bogaerts, 2013). Although the group that demonstrated significant improvement in *both* GWG and trait anxiety received both a nutritional advice/physical activity brochure plus four face-to-face “motivational lifestyle interventions” it was notable that the group that received just the brochure also significantly reduced their GWG compared to standard care. Whilst addressing state anxiety is important, it did not feature in this study, however, the finding that the utilisation of a nutritional and physical activity brochure demonstrated a

significant effect emphasised how information presented in this format could facilitate controlling GWG. Compared with face-to-face interventions, the production of take-home materials such as the brochure is likely to be relatively less expensive and logistically easier for women to access whilst still having some effect on GWG.

A randomised control trial that utilised group exercise sessions, and home diet and exercise counselling, found evidence for the efficacy of dietary and lifestyle intervention on controlling excessive GWG in the intervention group (Hui et al, 2011). The lifestyle intervention significantly reduced the occurrences of excessive GWG, increased daily activity and improved diet (Hui et al, 2011). The control group $n=88$ who received treatment as usual, with nothing different happening to them in their maternity care, were compared with the $n=102$ intervention group who received group exercise, and diet and exercise counselling, in addition to their usual maternity care. Although this study reported that utilising a lifestyle intervention of this type may contribute to managing GWG, the data from women living with obesity were not analysed independently from the data from other weight categories, therefore limiting inferences that could be made concerning the study's efficacy for pregnant women living with obesity.

A dietary and physical activity intervention was tested on normal weight and overweight/women living with obesity in the "Fit for Delivery" study (Phelan et al, 2010). The randomized control trial which stratified participants into normal weight and overweight/obese, allocated $n=200$ to care as normal and $n=201$ to care as normal *plus* intervention. The intervention consisted of: a face-to-face meeting and informative materials that promoted appropriate weight gain, plus healthy eating and exercise advice, alongside weight gain graphs. Furthermore,

these participants received feedback via phone call. Whilst the effect of controlling GWG so that IOM (2009) recommendations were not exceeded was seen in the normal weight women, there was no significant effect on the overweight/women living with obesity. Findings suggested that whilst this behavioural intervention was successful with normal weight women, it was deemed likely by the authors that a more intensive behavioural intervention involving a greater proportion of face-to-face contact may be necessary for overweight/women living with obesity.

The Lifestyle Course (TLC), a feasibility phase of a lifestyle programme for pregnant women living with obesity utilised an in-depth and complex intervention intended to manage gestational weight (Smith et al, 2015). As this was a feasibility study the outcomes sought were a test of the intervention and associated processes. The design of the TLC was based on current literature and “advisory groups” and based on Social Cognitive Theory (Bandura 1977, 1986). The intervention was designed and run by a multidisciplinary team which included: midwives, a physical activity instructor, community nutritionist and a health psychologist. Certain aspects of the study emerged as ineffectual or unsustainable, such as daily food diaries and pedometers, whilst other aspects such as the attendance of the 10 lengthy, weekly sessions, required modification. It was established that the weekly sessions were only possible for people to attend if the sessions were in the evening, and that parking and crèche facilities were required and the session needed to be extended to two hours long in order to cover the information without rushing. Although the TLC feasibility study concluded that with these adjustments, the 10-week programme could be considered acceptable and suitable for pregnant women living with obesity, it could be argued that the TLC intervention could be viewed as complex and expensive which must be a consideration in intervention design.

The UPBEAT (UK Pregnancies Better Eating and Activity Intervention) (Poston et al, 2015) examined the effect of a behavioural intervention on GDM and LGA infants. The UPBEAT intervention which involved weekly, trainer-led sessions found that the intervention was not adequate to prevent either GDM or reduce the frequency of LGA, however, there was some degree of reduction in GWG and maternal fat mass. Although there was some effect on gestational weight control, the UPBEAT intervention experienced poor attendance at the face-to-face sessions with 30% of participants only attending one of the eight sessions and 46% of participants attending fewer than four sessions. Considering the complexity and cost of eight trainer-led sessions and the provision of ongoing support to the pregnant women living with obesity throughout the intervention utilising face-to-face, in-depth intervention sessions it could be argued that such a resource-heavy approach is not sustainable for the increasing maternity population in the UK that enters their first trimester with a BMI ≥ 30 (Heslehurst et al, 2010).

The LIMIT randomised control trial considered whether diet and lifestyle advice interventions had any effect on health outcomes in overweight and pregnant women living with obesity and neonates (Dodd et al, 2014). Participants in the intervention group were between 10 and 20 weeks' gestation, had a BMI ≥ 25 and received primarily comprehensive dietary and lifestyle advice plus attendance, and one session with a dietitian who analysed their diet and exercise history and issuing them with personalised meal plans. Goal setting was also implemented and women were encouraged to set dietary and lifestyle changes. No improvement in maternal or birth outcomes and no reduction in macrosomic infants were found, although the study reports a reduction in high infant birth weight detailed at $\geq 4000\text{g}$ (Dodd et al, 2014). Whilst this study highlighted the need for further research that considered not just the GWG of

mothers with a raised BMI but also the clinical outcomes; it did not clearly present a significant effect of the intervention on maternal or neonatal outcomes other than high infant birth weight. Furthermore, the research population for the LIMIT study includes women with a BMI ≥ 25 and as previously discussed risks to health for both mother and offspring demonstrate a positive correlation with increasing BMI class, therefore, it could be suggested that the researchers should stratify their cohort by BMI to examine outcome measures for different weight classes.

The paucity of consistent and conclusive findings related to managing excessive weight gain in pregnancy suggested that there was limited research in the area and furthermore that the research which had been undertaken had not identified consistent strategies for gestational weight management that improved outcomes for mother and infant. A review of interventions to improve diet and weight gain (both inadequate and excessive) in pregnant teenagers identified that the majority of interventions employed a medical model of care with the inclusion of nutritional, informational support and advice (Nielsen et al 2006). Few of the interventions aforementioned utilised any theoretical framework or measured the effect of the interventions, other than physical/anthropometric measures on the mother and her offspring, such as weight gain and birth weight. Nielsen et al (2006) recommended that intervention design should involve the use of a sound theoretical, psychological framework. This approach would determine the salient determinants of the target behaviour such as attitudes and beliefs and measurement of outcomes, for example, dietary knowledge and attitude, dietary intake in addition to the physical outcomes. The feasibility and acceptability of a midwife-led intervention to encourage healthy diet and activity behaviours in pregnant women, based on Self Determination Theory, was assessed in 20 pregnant women attending a UK maternity unit (Warren et al,

2017). Pregnant women reported that it helped them to improve their health behaviours, and the study reported evidence for the effect of the intervention on SDT components. It could be suggested that applying a theoretical framework to intervention design, strengthened the intervention and provided a tangible measure of effect for the psychological aspects of health behaviour.

2.9 Current provision of weight management support and advice for pregnant women living with obesity: NHS Maternity service

The Quality Standard for Antenatal Care (NICE, 2012) stated that women with a BMI ≥ 30 at the first consultation with a midwife should receive personalised healthy eating and physical activity advice, and that this advice should be from an appropriately trained professional. NICE (2012) suggested that whilst this advice may be delivered by dietitians, for women who are obese class I and II, this support could be delivered by midwives and obstetric staff. NICE (2012) stated that health professionals should offer women this personalised support at the booking appointment unless they were insufficiently trained. If inadequately trained they should refer the obese, pregnant woman to an appropriately trained professional. Based on the findings from their large-scale meta-analysis, WiP (2017) suggested that conversations should be held as a part of standard UK antenatal care, that discussed the potential benefits of taking part in a GWG intervention that may help in the prevention of GDM and Caesarean delivery. WiP (2017) recommended that reassurances should be offered to women concerning the low likelihood of harm from seeking to manage their GWG in an intervention setting.

Macleod et al (2012) surveyed 78 midwives from a range of hospitals and midwifery settings, and found that less than half of their respondents $n = 35$ were convinced that weight management advice should be delivered by

midwives. Even fewer midwives reported that they personally provided guidance about appropriate weight gain during pregnancy regularly to pregnant women living with obesity. The consensus within midwives seemed to be that women living with obesity should be referred to a dietitian, however, it has been suggested that with such a significant proportion of the UK population with a BMI ≥ 30 , it may not be practicable to provide dietitian support for all pregnant women living with obesity. A costing report evaluating the cost of fulfilling the recommendations made by the NICE guidance (PH27) 'Weight management before, during and after pregnancy', identified that there were insufficient dietitians available to meet the demands (NICE, 2010).

Furness et al (2011) thematically analysed focus groups conducted with one group of obese, pregnant woman, and one group of midwives, concerning their views and experiences of existing support and ideas for support. Both groups expressed the belief that pregnant women living with obesity lacked the skills and information that would allow them to make healthy lifestyle choices for their pregnancy. Women in the study felt that they were not getting the information that they needed in order to inform their diet and lifestyle choices during their pregnancy. Midwives in the study expressed concern about raising the issue of high BMI with women as they felt anxiety about causing offence and this was echoed in the pregnant women's group with one woman expounding on how she did not wish for her pregnancy conversations with health professionals to be about her weight. Furness et al (2011) suggested that midwives should receive additional support and education with regards to their working with women living with obesity to address these difficulties in communicating about obesity in pregnancy. Christenson et al (2018) found that midwives' concerns about causing offence to pregnant women resulted in avoidance of potential difficult

conversations with women about weight and recommended specific training for midwives to help them overcome these barriers to communication.

An analysis of the maternity care experience of women living with obesity found that women were aware of the difficulty face by health professionals concerning discussion about weight in pregnancy (Atkinson et al, 2017). Analyses of the comments made on an online parenting forum concerning the publication of the NICE (2010) guidelines on weight management in pregnancy also identified that communication between midwives and pregnant women about overweight and obesity in pregnancy was difficult for both parties (Arden et al, 2014). Women posting on the forums commented about the lack of clarity concerning some of the information that they received about the risks of obesity and advice regarding diet and exercise, and many women felt stigmatised. The authors' recommended that midwives acknowledge the risks to maternal and fetal health that obesity in pregnancy presents. Arden et al (2014) suggested that these risks should be presented in a clear, consistent and non-judgemental way to pregnant women living with obesity and should be accompanied by support for pregnant women living with obesity to help them to manage their GWG. In support of the recommendations of Arden et al (2014), a feasibility and acceptability study that was conducted on a midwife-led health eating intervention for pregnant women, found that women welcomed the opportunity to discuss their nutrition and lifestyle choices with their midwife (Warren et al, 2017).

Maternal obesity places increasing demands on NHS maternity services stretching limited resources (Morgan et al, 2015). Health professionals, however, suggested that pregnancy may be a good opportunity to tap into the women's pre-existing engagement with health services, created by their pregnancy, to

address obesity (Heslehurst et al, 2011). Anxieties exist within health professionals regarding potential negative outcomes of using maternity care as a platform for raising obesity issue and offending or disengaging women from health services (McLeod et al, 2012). Phelan (2010) suggested that pregnancy was a “teachable moment” where women may present increased value for their health since it concerns the health of both mother and baby. Maternity health professionals, especially midwives, however, identified that further training would be required to enable them to broach, discuss and support issues of body weight and weight gain during pregnancy (Heslehurst et al, 2011, 2013).

2.10 Midwives: The frontline of maternity care

Midwives are the frontline of maternity care in the UK and in the vast majority of cases midwives are the health professional that has the first, and most frequent, contact with a pregnant woman throughout her pregnancy. This research considered, therefore, that midwives were in an optimum position to communicate with pregnant women about body weight and weight gain during pregnancy. Calculating a woman’s BMI at the initial consultation of the pregnancy would appear to provide the opportunity to raise the discussion about body weight and weight gain during pregnancy. NICE (2012) recommendations suggested that this should occur within standard practice, however not all women are given advice about weight gain during pregnancy by their midwives (Atkinson et al, 2017; Holton et al, 2017; McLeod et al, 2012).

A thematic analysis was conducted on the data of semi-structured interviews with women and midwives, concerning their experiences of gestational weight gain (Holton et al, 2017). Five themes emerged from these data: reluctance to and difficulties discussing weight and its implications; barriers to providing appropriate care to women with a high BMI; inconsistent weighing practices;

beliefs about the causes of obesity, and opportunities to assist women with managing their weight. Both women and midwives suggested that they were concerned about weight management and that it would be useful for women to receive specific information regarding managing their weight during pregnancy. Although midwives and women agreed that weight management was important to them, both reported avoiding conversation about weight and weight gain. Women did not wish to feel criticised for their weight, whilst midwives did not want to offend or upset women in their care. Midwives in the study suggested that in their view some women lacked the knowledge and skills to manage their weight in pregnancy, and that printed or web-based resources should be available to women as part of their routine antenatal care. Similarly, in an Interpretive Phenomenological Analysis (IPA) of the maternity care experiences of 15 women living with obesity, the data suggested that health professionals colluded with women to avoid discussions about obesity. The study suggested that this may have been a product of the discomfort that health professionals may have felt discussing potential pregnancy issues related to obesity. Women reported overall dissatisfaction with the communication from health professionals, whilst acknowledging the difficulty of communicating about sensitive issues.

A modified grounded theory analysis was conducted on the views of women and healthcare practitioners concerning the support for women who wish to manage their weight during their pregnancy (Furness et al, 2015). In agreement with other research discussed in this thesis, the core themes that emerged from this discourse included: the sensitivity/difficulty of obesity in pregnancy as a discussion topic; concerns about risking the relationship that exists between a pregnant woman and her midwife (primarily), and the need for additional training, supportive documentation and resources. This study recommended that there

health practitioners working with pregnant women living with obesity should be provided with additional training, resources, time and support to enable them to support women living with obesity optimally (Furness et al, 2015).

In research by Heslehurst et al (2013) midwives expressed the need for, training and education in obesity in pregnancy, and stated that in other health-related behaviours, training and education had made an impact on confidence and their motivation to raise and manage sensitive issues in their practice (Heslehurst et al, 2013). Midwives and other health professionals involved in the care of pregnant women living with obesity acknowledged the need to raise the subject of obesity in pregnancy and be honest about the associated risks, nevertheless conveyed concern about alienating or offending women. Midwives expressed a need for training to help them broach discussion with women living with obesity such as specialist communication skills, using sensitive language and giving positive messages to women about obesity in pregnancy. Midwives also talked about their wish for a greater understanding about: determinants of obesity and behaviours related to obesity; specific weight gain recommendations for women living with obesity and specific advice nutrition and activity advice for pregnant women living with obesity to enable them to offer optimal maternity care to pregnant women living with obesity. (Heslehurst et al, 2013). The potential of altering the relationship that they had with women and potentially disengaging women from health services was of concern to midwives and other health professionals, if communication that was related to weight and weight management was not well managed (Christenson et al, 2018; McLeod et al, 2012; Furness et al 2011; Schmied et al, 2011). Midwives felt that it would be helpful for them to have access to distributable resources such as information about key weight management tips and contacts for community-based support, and indicated that they would be willing to give them to pregnant women living

with obesity (Macleod et al, 2012). Nyman et al (2010) suggested that health professionals needed to examine their own attitudes and beliefs about obesity in order to optimise their care of obese pregnant women and offer practical and well-informed guidance. Furness et al (2015), Arden et al (2014) and Furness et al (2011) suggested that midwives should be provided with support, education and training in order to develop the skills that would allow them to communicate effectively and sensitively with pregnant women living with obesity about their weight and enable them to work optimally with pregnant women living with obesity.

2.11 Psychological intervention in weight management

A review of the effectiveness of health communication campaigns found that the average health campaign increased the number of people carrying out the target health behaviour by approximately 5% (Snyder, 2007; Bauman et al, 2006; Noar, 2006). Food choice is not a simplistic process and involves many interrelating factors; some tangible such as taste and cost, others more obscure concerning the psychological determinants of food choice (Delormier et al, 2009). Shepherd et al (2006) suggested that greater efficacy in nutrition campaigns was achieved by considering content and presentation of the message, the target population and specific behavioural goals.

In an address concerning the role of translational research in psychology and obesity, Dutton et al (2015) noted that psychological theories such as Social Cognitive Theory (Bandura, 1986) and Social Learning Theory (Bandura, 1977) had already influenced the development and modification of obesity treatment programmes in the US. Dutton et al (2015) argued that the translation of findings from psychological research into the continued development of prevention and management of obesity was imperative. In a systematic review exploring

psychological intervention for overweight or obesity, Shaw et al (2005) examined the efficacy of behavioural and cognitive therapy strategies both as weight loss strategies alone and in combination with diet/exercise strategies. The greatest success was seen in the behavioural plus diet/exercise intervention. Although the review undertaken by Shaw et al (2005) examined psychological intervention for weight loss in the general overweight and obese population, it could be suggested that the key finding was that interventions with a psychological component were more effective than a standalone strategy, and could be applicable when considering managing weight during pregnancy.

Dodd et al (2008) suggested that the inclusion of a psychological dimension in the design, implementation and evaluation of weight control intervention, strengthened intervention. Dodd et al (2008) found that a multi-faceted intervention including behavioural strategies was significantly more effective than interventions based on a single approach such as dietary advice alone. Campbell et al (2010) found that the psychological aspects of weight management in pregnancy received limited discussion in the systematic review of dietary and physical activity interventions for controlling weight gain in pregnancy. It could, therefore, be inferred from the absence of the use of psychological theories in weight management research, that historically psychology may only be viewed as having a secondary role in both the design and outcome of interventions for gestational weight management in women living with obesity. There has been insufficient evidence to draw conclusion about what constitutes an effective and useful gestational weight control intervention for women living with obesity. Reviews of the research to date have identified a relationship between the context and success of interventions; however, there has been little in-depth investigation of the psychological aspects of contextual influences. There are early indications that the utilisation of

psychological theory in the design and evaluation of intervention may increase the scope and quality of the research. This research posited that the development of an intervention based on the salient determinants of the target population's behaviour, alongside informational support, would be a rational first step in the design of that intervention.

Warriner (2000) explored how contextual factors, such as the beliefs of the individual or society, influenced the efficacy of interventions and argued that dietary attitudes and behaviours before pregnancy were related to pregnancy eating behaviours. Heslehurst et al (2007) stated that the beliefs of significant others (such as health professionals) influenced the amount of support offered to pregnant women. Identifying and addressing pertinent beliefs of pregnant women and their maternity health professionals related to the potential effects of dietary management on pregnancy outcomes may increase positive health behaviours for both.

Valek et al (2015) suggested that a psychological health promotion model i.e. Pender's Health Promotion Model, (Pender 2011) should be utilised to design clinical interventions concerning maintenance of weight loss in overweight and obese patients, based on the psychological components of that model. The model is composed of six components: perceived benefits of action; perceived barriers to action; perceived self-efficacy; activity-related affect; interpersonal influences and situational influences (Pender 2011, cited in Valek et al 2015). The authors' argued that the psychological components should be used by nurse practitioners to structure individually refined support to optimise the maintenance of weight loss in overweight and obese patients, following individual needs assessments based on the model's components. Didarloo et al (2014) assessed the efficacy of a psychological model, the Theory of Reasoned

Action (TRA), (Ajzen et al, 1980), plus the addition of Self-Efficacy (SE) (Bandura, 1977) in order to predict the dietary behaviour in a group of 352 women with type 2 diabetes. The authors were able to identify significant relationships between components of the TRA, SE and health-promoting dietary behaviours, such as regulating blood sugars through eating healthy foods. Didarloo et al (2014) argued that these findings should be used to tailor the delivery of educational interventions that seek to change the dietary behaviour of women with type 2 diabetes in order to improve the effectiveness of the intervention.

Psychological aspects of gestational weight control are relevant for both the pregnant women and all healthcare providers involved in a woman's pregnancy. Three major barriers to the delivery of optimum support for overweight and obese pregnant women were identified by Cogswell et al (2001); the knowledge, attitudes and time of health professionals involved in their care. The systematic review by Campbell et al (2010) highlighted significant variability in the extent to which weight management advice was received and understood by the women. In a focus group study with women who were mid-pregnancy, which concerned dietary advice and diet change, Wennberg et al (2013) reported that women had to find out dietary information by themselves, and tended to only receive dietary advice from their midwives when health problems occurred. Furthermore, Holton et al, (2017) and Wennberg et al (2013) stated that maternity health professionals found that the quality of the information received by women during pregnancy was questionable. The maternity health professionals stated that they were not necessarily in a position to discuss weight issues with women during their pregnancy and stated that they felt that pregnancy may not be the right time to address issues around weight (Wennberg et al, 2013). An Australian study (Knight-Agarwal et al, 2014) reported that midwives and obstetricians

believed that developing specialist interventions and evidence-based guidelines for working with child-bearing women to manage their weight should be considered a Public Health priority. The study concluded that pregnancy presented challenges for weight control because they believed that discussing weight was a sensitive issue for health professionals and women. Grimes et al (2014) found that women who had received midwife-led maternity care reported midwives as their most useful source of information, rather than the internet or other sources. It is therefore suggested that there is capacity for midwives to support and advise obese pregnant women regarding control of their GWG. A review of the literature identified that midwives had reservations about how they should broach a discussion and support women living with obesity with managing their weight during pregnancy. There has been no consistently effectual intervention that has encouraged and enabled midwives to manage GWG in pregnant women living with obesity. It is suggested therefore that underpinning the design and evaluation of an intervention with a psychological theory which addresses these reservations expressed by midwives; would strengthen the intervention (Hazeldine et al, 2016).

2.12 Conclusion and recommendations

An absence of research-based evidence has contributed to the lack of a robust intervention for gestational weight management in overweight women and pregnant women living with obesity. It could furthermore be suggested that many of the barriers were perceived by health professionals, to their delivery of effective support for obese pregnant women, would be addressed by the development of an intervention underpinned by psychological theory to address those barriers. An opportunity existed for developing an intervention to support the management of GWG in women living with obesity, utilising psychological

aspects in the design, delivery and evaluation of the intervention. This thesis has suggested that despite the central directives to maternity health professionals who care for women living with obesity which state that they *should* be offering support with managing GWG (NICE 2012), the sub-optimal engagement of maternity health professionals with supporting women living with obesity with their gestational weight management in pregnancy still existed. NICE (2010) directed that unless a woman who was category I and II obese had medical complications, she should be supported with weight management by midwives, however, midwives lacked confidence, resource and skills to undertake this task. Wennberg et al (2013) suggested that midwives could offer motivation and encouragement during early pregnancy to support dietary change if they were equipped with adequate knowledge and skills themselves to give this support. In a systematic review of interventions that sought to change maternity health professionals behaviour to support pregnant women living with obesity, with managing their weight Heslehurst et al (2014) identified no studies that were eligible for inclusion, and reported that studies focussed on the behaviour change of women, and therefore did not address the barriers that health professionals faced to their supporting obesity or weight management in pregnancy.

Since the research concerning gestational weight management intervention had been inconsistent and inconclusive, any proposed intervention for supporting gestational weight management in women living with obesity required testing to strengthen the evidence base. It was suggested that the development of an intervention to manage GWG should also be underpinned by a theoretical model. It was furthermore suggested that there was a need for a multidisciplinary approach and collaboration in developing the intervention for supporting gestational weight management in women living with obesity.

A rigorous evaluation and needs assessment with stakeholders (pregnant women living with obesity and health professionals involved in the maternity care of those women) was conducted. This needs assessment established: the experiences of stakeholders concerning controlling GWG; what components the intervention should include and how it should be delivered. Finally, the consultation identified the psychological aspects of gestational weight control (attitudes and beliefs) that would maximise the design and delivery of the intervention to support gestational weight control for pregnant women living with obesity.

Community midwives operate at the front line of maternity care delivery and cited willingness to provide advice and guidance concerning weight during pregnancy, yet expressed reservations about how to do this. As this thesis has discussed, the bond of trust that midwives reported having with pregnant women and the frequency of contact that they have with a woman during her pregnancy, provided an ideal platform from which to deliver gestational weight management support to her. This study designed and tested a behaviour change intervention for community midwives which sought to enable community midwives to offer support for pregnant women living with obesity with their gestational weight management. This research investigated whether a behavioural intervention underpinned by psychological theory increased the intention of community midwives to offer support for the control of GWG during pregnancy, to women living with obesity. Chapter three presents the conceptual framework, the Theory of Planned Behaviour.

Conceptual framework: The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) operationalizes facets of the meta-theory of social cognition and seeks to understand the internal cognitive processes underlying behaviour performance (Ajzen, 1985). The TPB has been successfully applied to a wide range of research in social and health behaviours such as: predicting walking and cycling behaviour (Bird et al, 2018); texting whilst driving behaviour (Bazargan-Hejazi et al, 2017); adherence to antiretroviral therapy (McKinney et al, 2015); alcohol consumption (Cooke et al, 2016, Hasking et al, 2015); cervical cancer screening (Roncancio et al, 2015); dieting behaviour (Myint et al, 2015); fruit and vegetable consumption (Kothe et al, 2015); hand hygiene (Smith et al, 2015); sedentary behaviour (Prapavessis et al, 2015) and smoking cessation (Hoda et al, 2015). Whilst the main body of investigation has sought to understand the precursors of specific health-behaviours; the efficacy of the TPB framework to underpin the design of behavioural intervention has also been somewhat researched. This chapter will discuss the theoretical background from which the TPB emerged and its role within research concerning the behaviour of health professionals. This chapter will culminate with the research questions for the study.

3.1 Background

The TPB is a Social Cognition Model, that is, a model based on the premise that an individual's observation of behaviour, and the consequences of that observed behaviour, serve to create some of that individual's knowledge (Bandura, 1986). Influences on that knowledge may be garnered from communications between others, own experience and external influences such as media (Bandura, 1986).

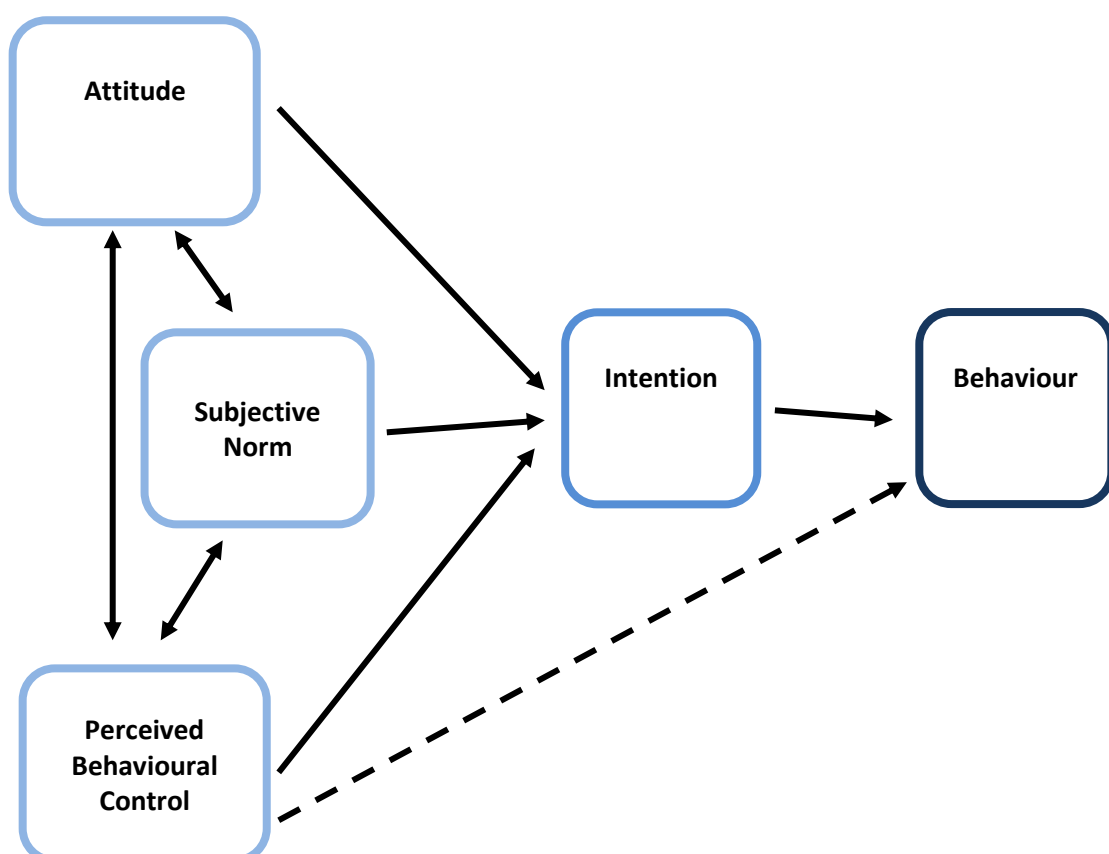
Bandura defined Social Cognitive Theory (SCT) in 1986 and posited the significant role that cognition played in behaviour and emphasised the pivotal role of self-efficacy in the likelihood of whether behaviour would be performed or not. If a person has high self-efficacy about their ability to perform certain behaviour then they are likely to perform that behaviour, conversely, those with a low self-efficacy regarding their capacity to perform behaviour are less likely to perform it. Application of SCT in order to change behaviour would address the “schematization of triadic reciprocal causation” detailed in the theory (Bandura, 1986). The schematization of triadic reciprocal causation refers to the reciprocal relationships between of three factors, those factors being personal factors (such as biological or mood, or mindset); environmental factors and behaviour. Fundamentally intervention to change behaviour would address 1) the personal self-efficacy that someone has toward the behaviour by improving self-belief regarding that behaviour 2) positive reinforcement when the target behaviour is performed and 3) facilitating the optimal environment in which to achieve the performance of the behaviour (Bandura, 1986).

The TPB is essentially a Social Cognition operational tool that may be used to define beliefs about a person, the environment and outcomes and use this knowledge to structure interventions or interactions that may increase the likelihood of the desired behaviour occurring. If self-efficacy is a predictor of behavioural performance, then one would expect to see a change in the self-reported self-efficacy of participants in a behavioural intervention study; hence this study will take a measure of self-efficacy in participants before and after the intervention phase.

3.2 Behaviour change

Ajzen's (1985) TPB hypothesised that behavioural outcome was best predicted by behavioural intention. The model proposed that behavioural intention was determined by attitude to the behaviour, subjective norm (perceived social influence) and perceived behavioural control (PBC) over the performance of the target behaviour. Attitude to the behaviour is formed by behavioural beliefs regarding the expected outcomes of the behaviour; subjective norm by beliefs about the expectations of others and motivations to comply with these expectations; whilst PBC is determined by control beliefs concerning the power of factors that may influence whether the behaviour happens or not. The more positive the attitude and perceived social influence plus the greater the individual's perception of control over the behaviour, the stronger that individual's behavioural intention should be. Ajzen et al (2007) noted that intention to behave is the precursor to actual behaviour if the individual is then given actual control over the behaviour. See figure 3.1, for a diagram of the Theory of Planned Behaviour.

Figure 3.1: Diagram of the Theory of Planned Behaviour model



Schifter et al (1985) found that whilst prediction of weight loss correlated with attitude and subjective norm, actual weight loss increased with the development of a plan that increased the PBC of college women on a six-week weight loss programme. It would seem reasonable to suggest therefore that an intervention plan that sought to change attitude to the behaviour by changing beliefs about the likely outcome of a behaviour; should examine the individual's feelings and beliefs about that behaviour. Furthermore, the individual's perceived social pressure to perform (or to not perform) that behaviour should be addressed and an examination of in that individual's sense of control over the behaviour should be conducted and subsequently addressed. If those aspects were successfully addressed, then that should increase the individual's *intention* to perform that behaviour and in turn effect positive behavioural change.

It is worth noting that whilst the inclusion of a TPB framework to a behavioural intervention may increase the likelihood of behavioural change, influences would remain that may affect the likelihood of behavioural change and the influence that the TPB may have on longer-term change is less well known. Ajzen et al (2007) suggested that long-term effects of the TPB were somewhat based on an assumption that repetition of the new behaviour would form new habits and over time that the behaviour would, therefore, be automatically activated. Albarracin et al (2001) identified the relationship between PBC and both behavioural intention and actual behaviour in a meta-analysis of condom use, however, a direct relationship between past behaviour and condom use was also found. Whilst past behaviour may indeed contribute to attitude and PBC it is important to remember that research has found that the direct effect of past behaviour may also be significant. Similarly, other variables, such as environment, that are not solely accounted for by the TPB are likely to contribute to the development of attitudes, subjective norms and PBC, however, their direct effect on behaviour

will not be revealed through the examination of the TPB. The rationale for personalising a behavioural intervention and identifying personally salient influences on behaviour must, therefore, exist, in order to account for these personal salient influences within the facets of the TPB in the intervention design.

3.3 Theory of Planned Behaviour, and the behaviour of health professionals

Although not widely used in research concerning the behaviour of health professionals, the TPB was successfully utilised to examine the relationships between belief and intention with regard to the views of obese and overweight women concerning physical activity in pregnancy (Weir et al, 2010). Data analysis in this study was informed by the TPB and findings identified that participants reported a lack of access to consistent information, advice and support on physical activity during pregnancy and suggested that midwives needed to engage with this aspect of antenatal care (Weir et al, 2010).

A systematic review of studies based on the TPB concerning the implementation of Shared Decision Making (SDM) into the practice of health professionals including: doctors, nurses mental health professionals and allied health professionals. SDM was defined as the practice of a health professional to make clinical decisions based on clinical evidence plus the individual characteristics and values of the patient (Thompson-Leduc et al, 2015). Examination of the studies using TPB identified which construct of the TPB had the greatest influence on intention and/or behaviour to practice SDM in order to use the theoretical model to underpin an intervention to promote SDM in health professionals. Thompson-Leduc et al (2015) identified that in a behaviour change study of health professionals $n = 4727$ that sought to implement SDM into their standard practice, subjective norm was the strongest predictor. This

thesis considered therefore that an intervention for community midwives to facilitate their involvement in managing GWG; would be strengthened by taking part in the intervention alongside their colleagues.

An examination of a cross-section of 65 health profession students asked whether the students intended to practice collaboratively to ensure patient safety (Lapkin et al, 2015). Use of the TPB to structure the questionnaire resulted in excellent internal consistency $\alpha.884$ and explained up to 46% of the variance in intention. Conducting the survey using the TPB also informed the research of the theoretical construct (attitude) that was the most significant predictor of intention, thereby the authors suggested that the structure of any behaviour change intervention with regards to the collaborative practice of future health professionals, could be structured with a focus on attitudinal beliefs.

The TPB was used to investigate the data of health professionals who participate in the information gathering Phase One of the study, in order to identify which beliefs were pertinent to key stakeholders. This enabled the research to focus aspects of the intervention on those specific beliefs. The TPB has also been used to investigate the relationship between health sciences students' experiences and beliefs and attitudes regarding breastfeeding choices to establish whether their attitudes were evidence-based (Dodgson et al, 2014). The premise for the research was that most health professionals were not receiving sufficient education with which to support mothers who wished to breastfeed. Use of the TPB to investigate the relationships between evidence and beliefs was able to confirm that this was the case and therefore this deficit in health professional education should be addressed (Dodgson et al, 2014).

Although there was a relatively small amount of research which had utilised the TPB in order to investigate what may encourage or inhibit changes in the

behaviour of health professionals, there was evidence to suggest that when TPB was used, it provided useful insight. This insight was used by this study to design a meaningful and relevant intervention, to optimise endeavours to bring about change in the practice of health professionals. NICE guidance in 'Behaviour Change: the principles for effective interventions' (2007) listed components that were based on psychological models that had been recommended for use in conjunction with social context to affect behaviour change. These components were: outcome expectancies, personal relevance, positive attitude, self-efficacy, descriptive norms, subjective norms, personal norms, intention formation and concrete plans. Application of the TPB to the investigation of the research area and design of the intervention sought to address each of these concepts within the social context of the delivery of antenatal care for pregnant women living with obesity. This study was, therefore, a novel contribution to the field of managing GWG in pregnant women living with obesity.

3.4 Research questions

The aim of the PhD study was to examine whether this study could design an intervention to facilitate community midwifery engagement with supporting the control of GWG in pregnant women living with obesity. Furthermore, this study tested whether the intervention would positively influence the intentions and actions of community midwives to offer support to pregnant women living with obesity in their care, to control their GWG. Since this study gathered two distinct sets of research data, the Phase One, qualitative data and the Phase Three, quantitative data the research questions have been presented separately for these phases.

3.4.1 Phase One research questions

1. What were the views and experiences of pregnant women living with obesity, and maternity health professionals concerning obesity in pregnancy and managing GWG?
2. What did pregnant women living with obesity, and maternity health professionals, want to happen concerning the management of GWG in pregnant women living with obesity?
3. What did pregnant women living with obesity and maternity health professionals think would work concerning the management of GWG in pregnant women living with obesity?

3.4.2 Phase Three research questions

1. Did the provision of a relevant resource for community midwives, increase their intention to offer support to pregnant women living with obesity to control their GWG?
2. Did the provision of a relevant resource for community midwives increase their offers of support to pregnant women living with obesity to control their GWG?
3. Did the provision of a relevant resource for community midwives increase their self-efficacy regarding their capacity to support pregnant women living with obesity with controlling their GWG?

Phase One: Needs assessment consultation

4.1 Introduction

This study adopted a Pragmatic Approach research design, driven by the research questions detailed in chapter 3 (Dudovskiy, 2018). The Pragmatic Approach (Dudovskiy, 2018) allowed for both an inductive, and deductive approach, and for the use of mixed research methodologies that were appropriate to the aims and objectives of the study. In this ‘Needs Assessment’ phase (phase one), the aims were to build a comprehensive picture of the existent state of affairs regarding obesity in pregnancy and managing GWG in pregnant women living with obesity, and to use this information to develop the study’s intervention. Phase One of this study, therefore, involved consultation with stakeholders concerned with obesity in pregnancy and managing gestational weight gain. Although as a requirement of the academic institute, some idea of how the research question may be approached was required; this was, in fact, a fluid notion which indeed changed as a result of this consultation and development process. This Pragmatic Approach (Dudovskiy, 2018) was maintained throughout the study and allowed the research to be responsive to systemic changes within the maternity service; details of which will be discussed later. This phase of the research utilised qualitative analyses of the stakeholder consultation data to inform the design of phases two and three and was a collective work with stakeholders. Appendix 1 presents a flowchart of the Phase One process.

Using qualitative methodology for this study’s needs assessment phase ensured the collection of “rich and valid” insights from the study’s participants (Stewart et

al, 2007), however, it is important to acknowledge that the researcher and research team were not merely passive observers in this qualitative phase. The researcher and researcher's supervisory team brought their own assumptions and background to the analysis of the data gathered for Phase One. Yardley (2000) stated that the diversity of methodologies and approaches in qualitative research may pose a challenge to ensuring the quality of that research, and that in order to ensure research quality in qualitative health research, reporting should include transparency (of methodological process) and reflexivity on the role of the researcher, and team within the research.

The research team consisted of the researcher, who had an academic background in Health Psychology and two supervisors. Both the supervisors were academics at the researcher's university and were a Registered Dietitian and a Registered Midwife. It is acknowledged in this study that as all three members of the research team (the researcher and her supervisors) were members of an academic institute, that membership of an academic institute may have influenced the production of the data analyses. In the instance of this research, a PhD study, the experienced and academic background of the supervisors was important to the research, to ensure that the researcher was methodologically rigorous in conducting the research.

The researcher was mindful throughout the duration of the study, that their own perspective, was to view the research from the viewpoint of 'Health Psychologist', and that this underpinned the rationale for the research, i.e. the behavioural and psychological factors associated with health issues. Both the perspective of an 'academic' and taking a health psychology approach would undoubtedly have influenced the way in which themes were captured/described,

and interpreted by the researcher, and therefore this study sought to mitigate potential bias in Phase One, by taking the following actions.

- 1) This study utilised Thematic Analysis as described by Braun et al (2006), and acknowledging that the coding and the development of themes were driven by the content of the data, i.e. capturing and reporting what participants actually 'said', rather than seeking to interpret what was 'meant', and the manner in which it was said. This study acknowledged that data were analysed from an experiential perspective, i.e. that the researcher 'learned' about the views and experiences of body weight and weight gain in pregnancy, from their exposure to, and consultation with, participants, rather than interpreting the data of those participants to elicit their 'reality', in a constructionist way. Further detail, about the use of Thematic Analysis in this study, is found in 4.2.3.
- 2) This study utilised the researcher's multi-professional supervisory team to review the researcher's coding and theme development. The stakeholder consultation conducted for Phase One included dietitians, hospital and community midwives, and pregnant women. Within the research team, all three members of the team were mothers, and in addition to their academic roles, the academic supervisors were also a registered dietitian, midwife (and diabetic specialist). This study suggests that the inclusion of other related professions in the team who reviewed the thematic development served to mitigate any potential bias that may have existed from the researcher's analysis, which was from a health psychology perspective. Furthermore, whilst researching from an academic, and a health psychology perspective, the researcher as a mother herself, possessed lived experience being a pregnant woman who had thought about body weight and gaining weight during pregnancy. The input of several personal and professional perspectives as reviewers throughout the Phase One analysis served to mitigate the potential influence on coding and thematic development that viewing the data from one perspective may have had.

Reflexivity as a step to ensure research quality in this study was achieved by consideration and discussion in this thesis, of the roles of the researcher, and of the researcher's supervisors (the wider research team), in relation to this research. Transparency of methodological process also served to ensure qualitative research quality and has been achieved in this thesis by the forthcoming description of the analytical process that was undertaken throughout this qualitative Phase One, Needs Assessment.

4.2 Design

The Pragmatic Approach design (Dudovskiy, 2018) utilised for this phase, was cross-sectional data collection using telephone interviews and focus group discussions, in order to explore the knowledge, understanding and experience of health professionals and pregnant women living with obesity, about body weight of pregnant women and their weight gain during pregnancy. Schedules for the focus groups and interviews were semi-structured and all participants were encouraged to expand on their train of thought and to feel free to talk about thoughts or experiences that were not directly covered by the questions if they wished to (appendices 2 & 3).

4.2.1 Sample

A purposive sample of fifty-six participants was obtained from Plymouth Hospitals NHS Trust in the South West of England. The sample consisted of forty-two NHS staff consisting of $n = 9$ hospital midwives, $n = 23$ community midwives; $n = 2$ midwifery care assistants, $n = 1$ student midwife, $n = 3$ obstetricians with clinical responsibility for complex cases; $n = 4$ dietitians; $n = 14$ pregnant women living with obesity.

In total, $n = 27$ participants took part in focus groups, and $n = 29$ participants took part in interviews. The breakdown of participants in focus groups and interviews are presented in table 4.1

Table 4.1: Participants who took part in focus groups and interviews

Focus groups	Interviews
Community midwives <i>n</i> = 11	Community midwives <i>n</i> =12
Hospital midwives <i>n</i> = 9	Obstetricians <i>n</i> = 3
Midwifery care assistants <i>n</i> = 2	Pregnant women <i>n</i> = 14
Student midwife <i>n</i> = 1	
Dietitians <i>n</i> = 4	
Total <i>n</i> = 27	Total <i>n</i> = 29

Differences that may exist between focus groups and interview participant characteristics and the potential influence that these distinct characteristics may have on the data gathered will be discussed, along with management processes in these different conditions, in 4.2.3 *Procedure*.

4.2.2 *Ethics*

This study conducted research with human participants, and as such was required to meet the legislative requirements concerning the ethics of research on humans. The Nuremberg Code (1947) (cited in Weindling, 2001), The formation of the European Convention on Human Rights (1953), The Declaration of Helsinki (World Medical Association, 1964), and the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) developed and evolved sets of guiding principles for research with human participants as responses to the mistreatment of human participants in research. Although not legislation themselves these significant events in history influenced and guided contemporary ethics legislation across the world, and have informed and guided UK legislation and process.

The ten points of the Nuremberg Code (1947) were:

- *Required is the voluntary, well-informed, understanding consent of the human subject in a full legal capacity.*

- *The experiment should aim at positive results for a society that cannot be procured in some other way.*
- *It should be based on previous knowledge that justifies the experiment.*
- *The experiment should be set up in a way that avoids unnecessary physical and mental suffering and injuries.*
- *It should not be conducted when there is any reason to believe that it implies a risk of death or disabling injury.*
- *The risks of the experiment should be in proportion to (that is, not exceed) the expected humanitarian benefits.*
- *Preparations and facilities must be provided that adequately protect the subjects against the experiment's risks.*
- *The staff who conduct or take part in the experiment must be fully trained and scientifically qualified.*
- *The human subjects must be free to immediately quit the experiment at any point when they feel physically or mentally unable to go on.*
- *Likewise, the medical staff must stop the experiment at any point when they observe that continuation would be dangerous*

The Belmont Report's (1979) guiding principles were:

- *Respect for persons: protecting the autonomy of all people and treating them with courtesy and respect and allowing for informed consent. Researchers must be truthful and conduct no deception.*
- *Beneficence: The philosophy of "Do no harm" while maximizing benefits for the research project and minimizing risks to the research subjects*
- *Justice: ensuring reasonable, non-exploitative, and well-considered procedures are administered fairly — the fair distribution of costs and benefits to potential research participants — and equally.*

The Declaration of Helsinki (World Medical Association, 1964) has been subject to many revisions, the most recent being 2013. It was not possible therefore to concisely summarise the content of the seven versions of the Declaration of Helsinki here. It can be stated however that the codes of ethics developed in each of the aforementioned events, can be viewed as fundamental to the requirements for ethical approval for research with human participants, in the UK.

At the time of this research, governance in the UK was delivered by four Research Government Frameworks (RGFs) (England, Northern Ireland, Scotland and Wales), however, at the time of writing these RGFs had been replaced by UK Policy Framework for Health and Social Care Research (HRA 2017). The new UK Policy Framework sought to “protect and promote the interests of patients, service users and the public in health and social care research, by describing ethical conduct and proportionate, assurance-based management of health and social care research, so as to support and facilitate high-quality research in the UK that has the confidence of patients, service users and the public” (HRA, 2018). Although at the time of research, this 2017 policy was still in development, it drew together the four pre-existent RGFs and adhered to the same principles. The aim of the change to the new framework was to create a single system for research in health and social care in the UK (HRA, 2017) and to simplify the process of application for ethical approval for research with human participants. Despite these changes to the RGFs between the time that this research submitted its ethics applications and the time of writing, the application process remained the same. Ethical approval for this study was made via the Integrated Research Application System (IRAS) (HRA, 2018).

As this research did not concern the testing of medicines it was not a legal requirement that the researcher complete Good Clinical Practice (GCP) training (International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH GCP), 1996). It was however a requirement of the University that the researcher complete this training, and the combined learning from the GCP training plus the guidance provided by successful completion of the IRAS (HRA, 2018) application process, was utilised to ensure that optimal ethical standards were met throughout this

research. Furthermore, the GCP training (IHC GCP. 1996) in addition to the researchers academic background ensured that the researcher was appropriately qualified to conduct the research as required by the UK Policy Framework for Health and Social Care Research (HRA, 2017).

Ethical approval for the study was obtained from the Faculty Ethics Committee and the local National Health Service Research Ethics Committee. The research did not begin until the Research Ethics Committee had given their approval, as required by Principle 9 of the UK Policy Framework for Health and Social Care Research (HRA, 2017). There were two applications made to Research Ethics Committees. These were the University's Research Ethics Committee and the NHS Research Ethics Committee (HRA, 2018). This ensured that every aspect of the underpinning principles of research with human participants was addressed before the study made any contact with potential participants. Completion of the NHS Research Ethics process via the Integrated Research Ethics System (IRAS) (HRA, 2018) ensured that the principles of research with human participants were applied to the research design throughout the study. All participants in the study were given an information sheet (appendices 4-7) and submitted a signed consent form (appendices 8-9). This information and consent process was confirmed verbally also before data collection began (Principles 3 & 12, UK Policy Framework for Health and Social Care Research (HRA, 2017).

In the following sections, this thesis has presented examples of how those principles of research with human participants were addressed in this study.

4.2.2.1 Meeting the requirements of research with human participants

Voluntary participation, informed consent and the right to withdraw

All participants were invited to participate and indicated whether they would like to take part by the return of the consent form via email. In some cases, such as when the researcher was in attendance at the antenatal unit, the researcher was in a side room in the antenatal clinic and midwives introduced the study to the women that they had identified as obese. These women were informed that if they would like to take part, they could come and visit the researcher in the side room at the end of their antenatal session with the midwife and she would introduce them to the researcher. However, if they did not wish to take part then they could proceed on with their day as normal at the cessation of their antenatal appointment. Midwives assured the women that this was an invitation to participate and that they were under no obligation to take part. This was affirmed by the researcher when the women did come into the side room both verbally at the point of introduction and as a part of the consenting process. Participants were also informed that should they wish to cease taking part and remove their data from the study, they were free to do so without giving any reason and without prejudice (Principles 3 & 12, UK Policy Framework for Health and Social Care Research, HRA 2017).

Doing no harm/justified activity

The IRAS (HRA, 2018) application process required the submission of a comprehensive description of what it was that each participant would be doing if they participated in the study. Additionally, IRAS (HRA, 2018) required the description of the activities that would be taking place, plus the length of time and location of each individual contact that the participant would have with the study. The purpose of this was to ensure that any burden to the participant was

minimised, and proportional to the possible benefit of the study ((Principles 3, 6 & 8, UK Policy Framework for Health and Social Care Research, HRA 2017).

Giving fully informed consent

Participant information sheets were developed for this study. These sheets described an outline of the study, why the potential participant was being invited to participate and what would happen to them if they decided that they would like to take part. These sheets also ensured potential participants that participation would be voluntary and informed them of their right to withdraw at any time without prejudice. Furthermore, contact information for the researcher, the contact for researcher ethics at the researcher's organisation, and the NHS contact. Where initial invitations for participation were made electronically, an electronic copy of the participant information sheet and the consent form were sent as attachments with the email. Where invitations to participate were made in person, a paper copy was given to each potential participant.

If there was a gap between the invitation to participate and the participant meeting with the researcher, the researcher issued another copy of the participant information sheet to the participant before they participated and this was discussed as part of the consenting process. Participants were asked if they had read and understood the participant information sheet before they started the consenting process and this gave participants the opportunity to ask any questions that they may have before consenting. The researcher ensured that the consent form was reviewed point-by-point with the participant before the participant signed the consent. At the point of consent, participants were verbally reminded that although they had consented, they were free to stop the interview/focus group at any point. All participant information sheets and consent forms were reviewed by the NHS Research Ethics Committee as part of the

NHS Research Ethics Approval process. Participants were also assured that if they had any questions after their participation, at any point in the future, that they could contact the researcher who would answer any queries, (Principles 3, 5 & 12, UK Policy Framework for Health and Social Care Research HRA 2017).

Care for participants' mental and physical wellbeing

As part of the IRAS process, it was necessary to detail any aspects of the researcher that could be considered to be sensitive or damaging. It was not considered that this study would cause any harm to participants, however, that some people may find a discussion about weight a sensitive issue. It was stated in the IRAS application that should this be the case and if anyone should appear to be distressed then the interview would be stopped if necessary. If the participant wished to continue then the researcher would reassure the participant of their right to move onto a different question or to stop the interview at any point, (Principles 1, 3, 5, 6 12 & 19, UK Policy Framework for Health and Social Care Research, HRA 2017).

Data confidentiality: Respect for the individual

All potential participants were assured of the confidentiality of their data should they take part in the participant information sheets and verbally by the researcher as a part of the consenting process. Participants were re-assured of the confidentiality of their data throughout their participation in the study. Participants were informed that when they took part in the study, the only document that would exist with their name on and their participation number, would be the consent form and that this would be stored securely in a locked cabinet, in a locked room and separately from their data. Participants were also informed that their data would be transcribed and coded **only** with their assigned participation number and that anything that could possibly identify them or

others, or places would be removed at the point of transcription. The anonymising of research data ensures a respect for the privacy of the individual who has chosen to participate. Furthermore, the participant was also given details of their participation code and informed that should they wish to remove the data from the study after the fact, that were able to do that anonymously by a request to remove the data associated with that code. This procedure seeks to assure the participant that should they wish to remove their data that this can truly be done without concern that they may be viewed negatively for doing so, (Principles 3, 12 & 18, UK Policy Framework for Health and Social Care Research, HRA 2017).

All aspects of the study's intended procedure and materials were reviewed by two ethics committees and approved as conforming to the principles of research with human participants, thereby fulfilling the Principles of the UK Policy Framework for Health and Social Care Research (HRA, 2017).

4.2.3 Procedure

The staff of Plymouth Hospitals NHS Trust were invited to participate in the study via face-to-face meetings followed up by an email which included the information sheet and consent form for the study. Consent forms could be returned electronically for convenience as well as by post. Additional information sheets and consent forms were issued to participants on the day of participation if they had not already completed the documentation. Pregnant women living with obesity were identified for the researcher by hospital midwives who discussed with the women whether they would like to participate in the study, before introducing the researcher during an antenatal clinic. Community midwives also consulted obese pregnant women about potential participation in

the study and passed on the contact details of women who expressed interest, to the researcher.

Focus groups were homogenous and conducted on the site at a location convenient for participants. Focus groups were conducted with all hospital midwives and dietitians (as they all practiced from the hospital and Maternity Unit at the hospital, and therefore it was most convenient for them to attend focus groups at the hospital), some community midwives took part in focus groups if they were able, whilst remaining participants took part in interviews as this was most convenient for those participants (details of focus group/interview participant characteristics were detailed in 4.2.1) . Focus groups and face-to-face interviews were conducted at the workplaces of the health professionals, and at a break-off room located at the antenatal clinics for the women. Women referred to the researcher by community midwives were interviewed at a location of their choice, which in all cases was their home. Appropriate procedures for conducting interviews in the participants' home were followed: 1) the researcher notified the supervisor where and when she was conducting the interview 2) the researcher notified the supervisor as she was entering the participant's home and then when she left the participant's home. All focus groups and interviews were recorded using a digital voice recorder and transcribed.

Both the NHS staff interviews and the focus groups were semi-structured. The schedules for the interviews and focus groups were developed by the researcher and reviewed by the supervisory team in an iterative process until an agreement on the final schedule was reached. Examples of the review of schedules by the supervisory team can be seen in appendices 10-11.

Participants were encouraged to expand on issues relating to their knowledge, understanding, and experience of body weight and weight gain during

pregnancy, that they wished to discuss. This study conducted focus groups, or face-to-face interviews according to the wishes of the participants. The decision made by each participant regarding which format (focus group/interview) they would like to take part in, was dictated by practical considerations that would minimise inconvenience to them. This study's Pragmatic Approach (Dudovskiy, 2018) utilised the most appropriate data collection method for each participant, however this study acknowledged that there may have been an influence of these different conditions on the data, and sought to minimise any potential bias as a result of those conditions via the management of the focus group/interview.

MacDougall et al (2001) suggested that focus groups generated a greater number of themes about a more diverse range of information than individual interviews, however In a systematic review of 15 articles which compared focus groups with interviews, Guest et al (2017) suggested that a greater number of themes would emerge from a single data collection even, with a greater number of people. Guest et al (2017) further noted that as responses in focus groups and interviews are often semi-structured and therefore guided by the questions asked, that it is difficult to make a comparison between data collection events in different studies. This study, whilst encouraging all participants to expand on aspects of the discussion that they felt were important and relevant, utilised the same interview schedule for participants in each group (midwives, doctors, dietitians, pregnant women), whether they were in focus group, or interview condition, notwithstanding minor changes (use of singular/plural for instance). It is suggested therefore that this study sought to minimise any effect of focus group/interview condition bias, by giving participants in either condition, the opportunity to discuss the same questions.

In a study evaluating the cost-effectiveness of conducting focus groups, compared with individual interviews, Namey et al (2016) found that 90% of the themes that were generated, were shared between the conditions, and concluded that interviews were the most cost-effective in terms of thematic saturation. Whilst the cost of data collection should be a consideration when conducting any research, this study's Pragmatic Approach (Dudovskiy, 2018) meant that ensuring data could be collected was of primary concern, and therefore the cost difference between the two data collection methods (focus group and interview) was not a deciding factor in this study.

A further consideration relevant to focus group versus interview characteristics was that concerning the discussion of sensitive material. On the one hand it could be suggested that individuals may be less likely to discuss sensitive material in a group setting than when in an individual interview, whilst on the other it could equally be suggested that an individual may feel more confident in discussing sensitive material that has been initiated by another person, in a focus group. In their systematic review Guest, et al (2017) concluded that the nature of the sensitive information influenced whether it was discussed more in focus groups than in interview settings, with Wutich et al (2010) finding that moderately sensitive material was elicited fairly uniformly across focus groups and interviews. Although the level of sensitivity of any discussion topic is a subjective view, it is suggested by this study, that the discussion of body weight and weight gain in pregnancy could be considered no more than moderately sensitive. It was not a requirement of any participant to talk about themselves, in order to discuss their views and experiences of body weight and weight gain in pregnancy, in order to partake in the focus group or interview discussion. It is suggested therefore that this would facilitate participants to discuss similar

themes (where appropriate) whether they were in either focus group or interview condition.

One of the important considerations of this study when conducting focus groups in particular, was to be mindful that quieter participants in the focus group were given the opportunity to speak. Focus groups were conducted with health professions, working within the NHS, many of whom possessed strong opinions on the current state of affairs, and their own experiences, regarding body weight and weight gain in pregnancy. In an interview setting it was possible to allow each participant to discuss at length whatever they wished to discuss, however in focus groups, it was important to give all participants the opportunity to take part in the discussion. Fern (2001) discussed differing listening strategies that were used in this study to elicit the views and experiences of all participants. For much of each focus group, the researcher utilised 'non-reflective' listening, where the researcher acknowledged what was being said using nodding, body language and assenting murmurs, but left space for participants to continue talking. In addition, the researcher also used 'reflective listening' in order to give quieter participants the opportunity to engage with the discussion, using strategies such as reflecting back what the participants have said, asking for clarification, paraphrasing and summarising (Fern, 2001). These strategies were employed by this study in order to encourage all participants to have as a greater a say as they wished to have, regardless of whether they were taking part in a focus group or face-to-face interview. Whilst, it is impossible to quantify any influence of focus group vs interview participant characteristics on this Phase One data collection, this study took informed steps to minimise some of the possible effects of focus group vs interview characteristics on data collection that have been reported in previous research.

4.2.3.1 Data Analysis

The interviews and focus groups were transcribed by the researcher using non-verbatim transcription for the purpose of data analysis, namely Thematic Analysis (Braun et al, 2006). Verbatim transcription was deemed unnecessary for this type of data analysis since verbatim transcription involves the transcription of everything including intonation, emphases, non-verbal noises and silence. Verbatim transcription such as the Jefferson Transcription System (Hepburn et al, 2013) is frequently used for discourse and conversation analysis where 'how' something is said is analysed along with the content of 'what' is said. This study utilised Thematic Analysis (Braun, 2006) because it is concerned with the *content* of 'what' was said in response to the study questions whilst the management of 'stake' that is a key feature of discursive analyses was not the subject of study in this thesis. As such, non-verbatim transcription, where the transcription focused on 'what' was said, was selected as the optimal method for this analysis.

Data were analysed using Thematic Analysis (Braun et al, 2006). Identifying a theme in Thematic Analysis is essentially identifying important commonalities in the data, in the responses to certain questions, pertaining to the research questions that are being investigated (Braun et al, 2012). The purpose of Phase One was to conduct a 'Need's Assessment' that would identify the determinants of the target behaviour and would inform the practical design and logistics of delivery of an intervention that supported pregnant women living with obesity, concerned with body weight and weight gain during pregnancy. With all of that in mind, this study utilised Thematic Analysis (Braun et al, 2006) to identify commonalities in the data of those who were most affected by obesity in

pregnancy, and used those commonalities or 'themes' to inform intervention design in Phases Two and Three.

Braun et al (2006; 2012) described a six-phase approach to Thematic Analysis: Phase 1: Familiarising yourself with the data; Phase 2: Generating initial codes; Phase 3: Searching for themes; Phase 4: Reviewing potential themes; Phase 5: Defining and naming themes; and Phase 6: Producing the report. This six-phase approach was reported as a framework which, if used to guide Thematic Analysis, would ensure research quality in the analysis. The methodological process of qualitative analysis that was adopted in this study followed the recommendations made by Braun et al (2006, 2012), in order to establish research quality according to Yardley's (2000) quality principles.

Phase 1: 'Familiarising yourself with the data', began in this study with the researcher listening to the audio-recordings of each of the focus groups and interviews, once through, and getting a 'sense' of the data, before transcribing the audio data. The researcher transcribed all of the data collected in this study, and via this process, initial observations were made in the form of single sentences or words in a notebook. An example of initial observations can be seen in appendix 12).

Phases 2: 'Generating initial codes'; 3: 'Searching for themes'; 4: 'Reviewing potential themes'; and 5: 'Defining and naming themes' did not occur in this study in a linear process as described by the six-phase process (Braun et al, 2006, 2012). In this study, the researcher was the sole data collector and transcriber, and therefore it was necessary for data of focus groups, and interviews, to be at different phases concurrently, as the data were collected. Data were therefore coded, and themes developed and reviewed as a continuous cyclical process, in collaboration with the researcher's supervisory

team, during regular meetings. This approach immersed the researcher in the data and assisted in the development of themes, and their definition and naming. As the Thematic Analysis progressed, when new data were initially coded, the codes were either common or novel to pre-existent data. If new codes were similar to pre-existent codes, these data were coded into themes that answered the research questions. Conversely, when novel themes emerged, these at times served to challenge developing themes and enabled the researcher to review the working definition that they had for a theme, considering whether it aptly described all of the data in that theme.

Initial coding was achieved by identifying patterns in the data (examples shown in appendices 13-16). As the data were initially coded, these were submitted to the research team for review. The researcher and the research team met face-to-face, regularly (weekly to fortnightly) throughout this phase and discussed coding, and the developing themes (phases 2,3,4 and 5, in Braun et al, 2006, 2012). Examples of excerpts showing the development of themes from the researcher's reflective diary for phase one are seen in Appendix 17. Appendix 18 illustrates excerpts from the Director of Studies' supervisory diary and details themes that were discussed and reviewed at the team meeting on those dates. During these team meetings, the research supervisory team reviewed whether they thought that the researcher had appropriately and adequately captured what the data were saying, in response to the questions posed to participants, and the research questions. When the research team deemed that as many themes had emerged as to consider this level of coding 'saturated', the themes were examined once again to identify any patterns that would allow them to be grouped into umbrella themes (or key themes). At this point, once again the data were discussed with the research supervisory team to review these themes. Once agreement had been reached between the researcher and the supervisory

team about the 'key themes' under which the individual themes could be groups, the individual themes were examined once more by the researcher in light of the facets of the TPB (Ajzen, 1985).

In this 'Need's Assessment phase of this study, the qualitative data fulfilled the dual role of firstly assessing the needs that the intervention needed to address, and secondly identifying the determinants of the target behaviour that were addressed by the intervention. In order to underpin *all* aspects of this study with the TPB, the themes were examined to identify which of the facets each of the themes was related to. For example, "Role of Family" was related to Normative Belief since it was a theme that concerned significant and important people for the individual, whom may influence their beliefs. Many of the individual themes sat under more than one of the TPB facets and this is reported in greater detail further in this chapter. Behavioural Beliefs, Normative Beliefs and Control Beliefs concerning obesity in pregnancy could be identified from within the data of health professionals and pregnant women living with obesity, these data would provide tangible examples of how each belief presented itself in relation to aspects of obesity in pregnancy and controlling gestational weight. These tangible 'examples' as design notes for all aspects of the intervention design process, that is, these examples told the study what tangible aspects to address and how to address them. The data of participants were therefore used to inform the design of the behavioural intervention. The results presented in 4.3 can be considered as Phase 6: 'Producing the report' (Braun, 2006, 2012) and as such are presented as a 'story' about the data that answered the Phase One research questions, and drove the intervention design in Phases Two, and Three.

4.3 Results

Examining how body weight and weight gain during pregnancy was experienced by key stakeholders

An inconsistency existed between what women knew they should do to eat healthily during pregnancy and what they actually did. It may be assumed that some of what mediated the conflict between the “knowing what to do” to maintain good health and optimum body weight and the successful application of that knowledge, is the same for a pregnant population as it is for a non-pregnant population, however, the data also suggested that there were unique influences that affected individual engagement with body weight and weight gain issues and advice during pregnancy. The data further suggested that some discrepancy also existed between the recommendations that health professionals make regarding exercise and physical activity during pregnancy and the recommendations made by key organisations such as The Royal College of Obstetricians and Gynaecologists. It is important to note henceforth that the data and associated statements/inferences made, that are attributed to the various health professionals (community midwives, dietitians, hospital midwives, midwifery care assistants, and obstetricians) can only be attributed to the influence of the health professionals who participated in this study.

The themes that emerged from the data are grouped into four key headings:

1. The current state of affairs
2. Perspectives on an intervention: what may work
3. Influences on uptake and successful weight control
4. Taking things forward

Themes are expounded firstly within those headings and then further developed around the framework of the Theory of Planned Behaviour to explicate the application of the components of the TPB to a behavioural intervention to support the control of gestational weight gain in an obese population.

Key: **CMW** – Community Midwife; **D** – Dietitian; **HMW** – Hospital Midwife; **MCA** –Midwifery care assistant; **OBS** – Obstetrician; **W** - obese, pregnant woman.

4.3.1 Key theme 1: The current state of affairs

This umbrella theme codified themes that described the current situation regarding body weight and weight gain in pregnancy and described the position that health professionals felt they occupied. Health professionals communicated a current condition where body weight and weight gain during pregnancy were not an established subject within the maternity care process and consequentially some health professionals lacked confidence in raising the topic with women or had little knowledge of resources available to support women with raised BMI and managing weight gain during pregnancy.

The following sub-themes described the way in which the management of body weight and weight gain during pregnancy emerged as novel and how that was manifested in the experiences of health professionals involved in maternity care.

1. Broaching the subject (No established path to support the subject of body weight and weight gain in pregnancy)

In this theme, the sense that there was no universal established path by which to encourage and support discussion with pregnant women about body weight and weight gain in pregnancy emerged from the discourse of health professionals.

"I suppose because it's not part of our everyday role it's not something that you've been accustomed to having to do...This isn't something that at the moment we have had to incorporate into our daily routine of our practice and therefore I certainly would have to think how I did it" (HMW01)

"So if you came across someone who you clearly could identify as being obese erm...do you think you would feel comfortable talking to them about it?" "I don't know that I would if I'm honest" (HMW02)

"If I didn't know them and that's the first meeting and I didn't want to be upsetting them on that day because I don't want them to go home and say "Oh the midwife says I'm fat" so I probably would be really cautious about how I do that (CMW10)

"...if they ask I'll discuss it but not routinely about weight gain" (CMW06)

2. Path of resources not necessarily clear to health professionals

This theme concurred with the expression by health professionals that there was no established path for raising discussion about body weight and weight gain in pregnancy; with a further expression that any path of support resources for managing body weight and weight gain during pregnancy was either not clear or resources were simply not available.

"It's not a great feeling as a practitioner because you want to be giving them an all singing all dancing something and in fact, you don't feel you've got the right tool" (CMW10)

"I am not sure about the robustness of the resources that are kind of out there and the pathways I don't think are good and clear towards that. I don't feel clear about it so they're not going to feel clear about it" (CMW10)

"I don't really think there is anything specifically set up for pregnant women...not to my knowledge" (CMW06)

"I personally have never told anyone about weight management things because I don't know about them...It [support] is maybe not out there enough because I don't know about it and I don't know who can go..." (CMW11)

"Not that I'm aware of unless they get referred to a consultant for that and again I'm not a hundred percent sure about that; whether they are consultant-led care and whether they get an appointment at the antenatal clinic" (HMW02)

“No...not you know? Whereas we automatically...we offer women referral to smoking cessation we don't automatically...I don't know that there is anywhere that we could automatically say “well would you like help in this area so that you don't gain excess amount of weight?” (HMW02)

“Well, it's...there's just nothing available really. I mean I would perhaps tend to refer to the GP...If they're sort of saying “I absolutely really need some help with my diet” ...I mean the other thing that's perhaps open is private referral an um...meditation that sort of thing...acupuncture sometimes all those sorts of other alternative avenues might actually help” (CMW02)

“There is in the guideline that because I did double-check that there is the suggestion that when we can [unclear] or refer to dietitians without being diabetic but I have to confess I haven't done it. Now that's possible my lack erm, y'know so it's very interesting having someone like you coming along saying “what do you do?” [Laughs]” (OBS02)

“We did have the weight in pregnancy leaflets didn't we didn't we?” (CMW21) “and then they disappeared” (CMW19)

3. Stretched and limited resources

It emerged from the data that where health professionals (particularly midwives and the obstetricians) were aware of what resources path should ideally be available; they were also aware that those resources were in practice not accessible at all or difficult to access and overstretched. Health professionals also identified that the increase in overweight and obese pregnant women was stretching, and therefore limiting, resources that were available for them.

“It does happen but not as [unclear] as we can because the facilities aren't there. I'm currently fighting like hell to get a dietitian into the second diabetic clinic that we are having to put on because these women are so obese and they say there's no money for it. Well actually there's no point getting a diabetic clinic if I can't get a dietitian in it” (HMW05)

“...but it has a huge impact on our service because the number of scans that the women require go up massively because when they are obese you can't assess them clinically” (HMW05)

“...we are supposed to refer to dietitians when we book them is their body mass index is over thirty-four but erm, but the dietitian's department isn't

actually accessible at the moment so we don't get access to those...to the dietitians so" (CMW02)

"Yeah and we have a protocol for what to do with a patient who is above a certain BMI. It keeps changing it was thirty, and that involved...that involved far too high a majority of patients of Plymouth" (OBS01)

"...your visuals are at a minimum because people are cutting back on the amount of literature they'll buy into primary health care. I think there's definitely room for improvement" (CMW07)

4. Discussion of body weight and weight gain in pregnancy: a mixed reception

Health professionals acknowledged that any discussion about body weight and weight gain in pregnancy was not necessarily favourably received with some pregnant women welcoming discussion but many objecting to or being offended by, the conversation.

"There are some that seem to take it well and you get feedback that they're not happy about it...erm, but I think it depends on their state of mind at the beginning. It's not always well received" "No. I think it's a very tricky subject" (HMW05)

"...they don't like it. They don't like it at all to be told they are overweight and we do get complaints coming back that women said "Oh they said I was fat" but y'know community midwife came in today [name removed] and she said this woman sat there with a...her BMI was thirty-eight and she said "I'm not fat" "I'm not fat" so [name removed] had to explain to her that she was highly at risk" (HMW05)

"...so that's sort of gone out of the window but as far as it...it's like smoking you know the more you harp on about it they tell you what they want...what they think you want to hear and then go off and have a huge pasty and a packet of crisps [laughs] when they go" (CMW01)

"I find it difficult. I've had it thrown back in my face before. Literally, all I have said is about Body Mass Index and they've complained. I was horrible apparently. (CMW14)

"She thought that we were constantly picking on her and she found that offensive" "Was she rude to you?" "Yes. Her husband was in the end. She would get him to do all the talking. It wasn't just me it was with other midwives and consultants as well" (CMW20)

"I think most people know. Most people know and they're honest and y'know if you've got a BMI of thirty-five then it's an objective measure and

you're forty and whatever then, in any case, people know so I haven't, I can't remember raised heckles because of raising it" (OBS02)

"If you point out they're in the above forty, they're in the, if you tell someone they are morbidly obese that's when they tend to get angry" (OBS03)

5. No specific guidance on body weight and weight gain in pregnancy

It emerged that that was no clear, universal knowledge across all of the health professionals about whether there was any specific guidance on body weight and weight during pregnancy. For health professionals who felt that there may be some guidance, there was no clear and universal understanding of what those guidelines were.

"I don't think they have any guidelines specifically other than people gain varying amounts of weight but in general isn't it somewhere between 10 kilos and it's like a really wide range isn't it? So I don't think it's really very specific" (D01)

"Well, the only guidelines that we have there is not how much they should put on but actually what to do with them when their BMI is...so actually we don't you know we don't get told in that guideline y'know it's basically how you manage them...not how to actually make sure they put on the right weight" (HMW05)

"I don't think that I'm probably armed with enough information sometimes...because there just seems to be a huge range really in what is an acceptable weight gain in pregnancy...it was so much easier because it was very prescriptive years ago" (CMW10)

I: "Does everybody know the recommended weight gain for each of the weight categories?" "No, No. Not for the weight categories" (CMWs 12-18)

"My understanding was that if it was with a normal BMI it should be two maybe three stone but if your BMI is raised it should be less...less than 2 stone but actually what they should aim for is to end their pregnancy at the weight they started" (CMW13)

"We're probably not giving the same advice at the same times" (CMW20)

"I don't have the confidence in even those consultants being aware of those messages" (CMW10)

"I mean sometimes people do, do raise the issue of what they should do about it and erm, in, I suppose in general terms erm, we don't, I don't,

and I guess most people are the same, wouldn't be recommending drastic weight-reduction programme" (OBS02)

"They hang onto "Oh you shouldn't diet" ...yes you can. We don't like you starving yourself...but eating a healthy diet and aiming to be the same weight so overall you've lost two and a half stone over nine months, that's not dangerous" (OBS03)

6. Discussion of exercise and physical activity during pregnancy

This theme concerned the types of exercise and physical activity that health professionals felt comfortable recommending during pregnancy and illustrated a cautious approach to exercise and physical activity during pregnancy. Discussion of this subject was entirely within the midwife focus groups. A consensus that pregnant women should not start any new exercise in pregnancy emerged from the data and also that walking and swimming were ideal physical activities for pregnancy. Yoga specific for pregnancy was also identified as an appropriate activity although midwives commonly recognized that water-based activity such as swimming and aqua natal would be particularly appropriate for overweight and obese pregnant women as the water supports their body weight.

"The main thing is if you have been doing it up until conception continue to do it as long as you feel happy doing it...and that was her advice "if you don't do any exercise don't start anything new now" (HMW03)

"...but yeah but we all just shy away from it, it's awful but..." (HMW02)

"Erm, walking...but often you find if it's a lady that's always been overweight often she's got other ailments like bad backs or legs hurt erm...what else...? I think any light exercise if it is done in moderation and if it is done sensibly" (HMW02)

"I don't remember that no...other than what we just said...my mentor would say that at booking but other than that...just apart from that say don't take on anything new and continue" (HMW03)

"...and swimming is brilliant because it takes all the pressure off the uterus does it? But you, you know we've got an increase in super-pubic pain now that is down to hormone but I did think that with the bigger ladies the weight doesn't help does it?" (HMW05)

7. Distributable resources: There's room for improvement!

The standard information or guidance associated with eating during pregnancy discussed by health professionals was a healthy eating leaflet sometimes given at booking which health professionals suggested was of some limited use and the Pregnancy Book. Midwives suggested that women received so much other information at booking that information about healthy eating may not necessarily be considered a priority. Community midwives consistently bemoaned the loss of the 'Pregnancy Book' suggesting that in their short window of consultation time the book allowed women to read sections in their own time that midwives recommended and gave the midwives a tool as a frame of reference from which to work. One of the pregnant women who had known of the existence of the Pregnancy Book expressed regret that she wouldn't be getting hers. Community midwives also felt that the Pregnancy Book was a well written, friendly, accessible form of information and did outline healthy eating and weight as a potential starting point for discussion furthermore community midwives felt that the Pregnancy Book was much less likely to be accessed and used in the same way in its new online PDF form. Finally, community midwives suggested that inclusion of something in the Bounty Pack regarding healthy eating and weight management, for women to read at home, may be useful.

"I think erm; especially at booking women already get so much information at that initial booking... I think if you put more information about healthy eating it's gonna get...in more cases than not it's gonna get disregarded" (HMW01)

"Personally I think giving them the information beforehand because then they've already come to that booking with a little bit of information, a bit of background knowledge and then if they've got concerns" (HMW02)

"I think if you stick it in an envelope and then put it in the Bounty Pack I think you are more likely to have people look at it rather than a load of leaflets" (CMW06)

"We used to have the Pregnancy Book, the purple Pregnancy Book that had the chapter in it on healthy eating in pregnancy...you know that if they were to look at that they would know what a healthy diet it but now we don't have that...The majority of them did look at that Pregnancy Book." (CMW06)

"...for some women it's a real struggle and you feel that they might go home and sit and flick through that and you can sort of point at that page with the healthy plate type thing..." (CMW10)

"...it is a loss because not everyone has technology. Technology comes with finance and your ability to access your nice computer for iPhone or whatever..." (CMW10)

"There isn't anything about diet and now we've lost the Pregnancy Book" (CMW17)

"A little pack to get them thinking like with the Eatwell Plate and a load of stuff on GI so it's not about dieting and it's not about calories, it's about food choices and where it impacts" (CMW13)

"It would be quite nice to have a bit more of a resource that I can go to, a book where you can look into and think "I've got twenty minutes to do tea so let's do that" (W10).

"I think that kind of information pack would be useful. I think it would be useful right at the beginning" (W11)

8. Whose responsibility?

The issue of responsibility for body weight and weight gain in pregnancy emerged from the discourse of health professionals; particularly midwives and doctors. The belief that other people were responsible for aspects of addressing body weight and weight gain during pregnancy featured in the discourse of hospital midwives, community midwives and hospital doctors. Some hospital midwives expressed the belief that community midwives were in the more appropriate position to cover body weight and weight gain during pregnancy because they had a longer relationship with women and some simply expressed that it was not within their role as a hospital midwife. Doctors identified that there are potential problems associated with all parties not taking responsibility for body weight and weight gain during pregnancy. Some pregnant women living

with obesity suggested that the responsibility for broaching their obesity during pregnancy was left for them to do as opposed to being initiated or supported by any health professional. This theme supported the notion that both health professionals and pregnant women felt there was no clear, universally understood, established path within the maternity care system to address body weight and weight gain during pregnancy and that broaching discussion about body weight and weight gain during pregnancy remained to some extent an individual decision.

"I think the NHS is not doing them [women] a good service. There is a good service i.e. Slimming World but for individual women that's expensive but in terms of the Health Service it would probably be a bargain." (CMW03)

"It shouldn't rely on that personal interaction" (CMW10)

"I think it would be more of a community midwife that...because they see that they initially...they initially had that erm...initial consultation and then they see themselves as they will see a lot more of them than we do particularly with the high turnover of patients that we have" (HMW01)

"I'm not qualified to oversee, manage an obese person's weight...it's about signposting people" (CMW18)

"Yeah but again the decision is made by me. I don't feel it's erm, that it's part of the bigger plan" (CMW10)

"Part of the problem is the GPs have...I supposed the fairest to say is got used to that piece of work being done by midwives" (OBS01)

"...and erm, you know our focus I suppose as doctors, it's awful really, but we are focussed on dealing with the situation that faces us we don't perhaps concentrate perhaps as we should on preventing them from getting bigger" (OBS02)

"I feel like I'm the only one that's concerned about my weight gain which is lovely in some respects but also it would be lovely to have that little bit more support" (W11)

In these themes, it could be seen that health professionals believed that there was no clearly defined, established framework for managing body weight and weight gain during pregnancy.

4.2.2. Key theme 2: Perspectives on an intervention: What may work?

This second umbrella theme consolidated the discussion by health professionals concerning the components of any weight management for pregnant women; the practical aspects of how to deliver support. Dietitians contributed significantly more to this umbrella theme than to the previous “Current state of affairs” theme and it seems reasonable to suggest in this theme the dietitians in this study were drawing on their expertise in delivering weight management interventions for non-maternity population to contribute appropriate views, experiences and recommendations for a weight management intervention with a pregnant population.

9. Early intervention

Midwives (hospital and community) and pregnant women living with obesity were the contributors to this theme. Midwives expressed the belief that early intervention would be the most effective and appropriate time for women to receive weight control support in order to achieve optimum benefit from the support and optimum health benefits for any changes made to diet and lifestyle.

“But if we educate people and say well actually you know from very early on in pregnancy it’s not using scare tactics” (HMW03)

“So they are so keen to get in there and just do pregnancy related things early on and then when we tell them they got to wait until they are like thirty-four, thirty-five weeks they are all like “ah...right...” (HMW03)

“I think...my feeling is I think they need to be told at the beginning of their pregnancy you know “Your weight is an issue; if you want to do the best for your baby you probably need to you know; you probably need to address that and these are the risks you are putting yourself at”. I don’t think that we are...I think we faff around too much like you said we dress things up don’t we?” (HMW08)

“Yeah...yeah so it might be useful to actually erm, get that sort of going from twelve weeks or at least from when the children’s centre that have all these ladies” (CMW02)

"I think that kind of information pack would be useful. I think it would be useful right at the beginning." (W11)

10. Being non-judgemental

The importance of taking a non-judgemental perspective when discussing body weight and weight gain during pregnancy, and in constructing and delivering an intervention, emerged from the conversation of health professionals and pregnant women. Use of judgement phrases such as 'censoring', 'attack' and 'harping on' by health professionals, captured the perceived risk that health professionals expressed, that care must be taken to avoid alienating women when discussing the issue of body weight and weight gain during pregnancy with them. Obese pregnant women noted how important it was for them to not feel judged and suggested that if health professionals behaved in a judgemental manner it would dissuade them from returning.

"we need to mention it regularly; it should be sort of where women have got a raised BMI it should be not...not attack them but to discuss, just bring it to the forefront at antenatal appointments" (HMW01)

"Yep! I do think if they express concerns I think to be actually....to be able to offer them proper support in a non-censoring way" (HMW05)

"and they used to dread being weighed. They used to dread coming to clinics because they got told off one way or the another" (CMW01)

"I think with food it is very much the same and I think the more we harp on about it the worse the affect it will have" (CMW01)

"I want to be in that position...not be judgemental, be professional and be helpful about it" (CMW10)

"Women living with obesity that I've had feel that they've been treated as second-class citizens" (CMW14)

"I'd like to think that I'm not judgemental. I know I have a laugh" (CMW19)

"...sometimes it's patronising to be given advice and you think "right clearly I'm a heifer!" (W10)

"...the midwives are not there to judge you or trying to be anything but by saying it, when they're saying it to you, it's personal on my behalf but not theirs so it would be nice to have it in a leaflet and you can decide whether you want to or not" (W10)

"It's only the GP who was quite fattist and said "well you've got the weight to lose just go with it" (W11)

11. Being fun/sociable/peer support

Related to being non-judgemental, being fun/sociable and the effect of peer support developed as a theme from the data of health professionals who identified that utilising the sociable element of group activities and/or shared experience could encourage engagement with and increase the efficacy of any support for gestational weight control offered; through peer support and enjoyment of the activity.

"Use your buggy to lean on and do your leg-lifts and things and its very much commune...its' er very much support, participation elements" (D02)

"they could make it a bit more fun and I'm actually sure... it's in a group isn't it and with pregnant women in if you haven't got friends that are pregnant all you want to do is meet other pregnant ladies so you can discuss bumps and what you're buying and" (HMW02)

"whereas if it was like social, everybody together to learn about healthy eating, so it doesn't matter what your BMI is, it doesn't matter what sex of baby you're having, it should just be that if you wanna go and you wanna learn you can learn" (HMW03)

"I think when things are done as a group you learn things from other people that works for them that sometimes can work for you" (HMW08)

"because you are then you are more likely because then the women will have a break and have a chance to have a nice chat and you know meet up with other people" (HMW05)

"it's just a matter of the support and very often peer support will be much better" (CMW01)

"It is. It is very and also you haven't got moral support and I think one of the benefits of having y'know maybe face-to-face or something or meeting with other people; there's a huge benefit in just being with other people" (OBS02)

"You know what would be good some kind of pregnancy group that wasn't directed towards children, its more directed towards the mum...it would be nice to go with your toddler and your baby but be able to talk about weight loss and y'know have a Weight Watchers type thing but where your children are welcome. That would be an awesome thing because I know a lot of people who would go to that" (W10)

"It is something I look at however I'm a bit dubious about the web [chat forums] just because you don't know, just because information you might pass over...I do think it helps. I actually read one on Children and Baby Centre...I'm not on it but I do read it just to see what other people are doing" (W11)

12. Skilling up

Health professionals and pregnant women discussed that skilling-up with relevant, basic, practical skills and knowledge would empower pregnant women to make informed choices and would be useful for managing their daily lives. Health professionals (particularly community midwives) also identified that skilling themselves up with knowledge about body weight and advising and supporting appropriate weight gain in pregnancy would help them to offer support to pregnant women. Dietitians offered examples of practical ways of achieving an increased understanding of food and healthy eating for pregnant women, grounded in their wider experience of weight management across the general population

"...well I do actually look it up on the internet and things but it would be nice if you could have some kind of resource that you could go to and think "Oh what am I going to cook tonight y'know and there's something there y'know and its store cupboard generals y'know?" (W10)

"or even if you could like slow cooker recipes that would be good because in the morning when she's asleep I can go and whack it all in the slow cooker and then by the time tea time comes I haven't got anything to do except getting the plates out. That would be really quite good." (W10)

"For me, structure is better than nothing and that's what I couldn't get from weight management, they couldn't give us a diet they just said "small, sustainable changes" I "Would it be helpful if somebody said...y'know with a couple of sample days?" "Absolutely...I don't want a full diet but just examples" (W11)

"What I would probably like to be armed with is better information about y'know what is safe really" (CMW10)

"I think so long as the person was knowledgeable I don't see why you'd have to be a trained dietitian" (CMW04)

"I don't think that I'm probably armed with enough information sometimes just about what would be...because there just seems to be a huge range

really in what is to be an acceptable weight gain in pregnancy...” (CMW10)

“You don’t want to make it too onerous for the practitioner and you don’t want to make it too onerous for the mother, you want it all to sit comfortably but you want, well I want clarity” (CMW10)

“I personally have never told anyone about weight management things because I don’t know about them” (CMW11)

“Everything else that we give is the sum total of bits of people’s lives and bits of people’s experiences” (CMW17)

“Because they all do ask us don’t they? Those who really want to do something about their weight or who are open-minded about it, do ask a lot of questions about it and sometimes we’re going by experience rather than factual” (CMW23)

“I think also advice has changed over time and what you used to say isn’t necessarily relevant to today. I have to say, hand on heart, I would no longer you know...I don’t know whether that’s still relevant” (CMW20)

“skills around preparing and cooking healthy food as well is a big one too I think” (D04)

“Yeah, I’d say cooking skills and portion sizes, what’s a normal portion size?” (D02)

“I think as well like the portions, I know a lot of people have found portion plates really good and really helpful with sort of sticking to set portions because the advice regarding starchy food is quite sketchy as well during pregnancy” (D03)

“The other thing that’s very good is, is label reading. It’s really useful for people reading food labels to get them aware and that it’ll be a useful tool to get more help with and also looking at fats and oils with food...” (D04)

“certainly with things like the food labels and actually identifying what you can get in terms of healthy eating for your 5 pounds rather than looking at your ready meals” (D02)

“but I think; I think it works very well. I think the idea of looking at the sort of affordability of food is quite useful and some, the work around planning is really good as well” (D04)

“I think a lot of it comes down to planning and lack of erm, ability of thinking of things about menus and menu planning and food shopping is actually...makes a huge difference to people” (D04)

“the nurse...the nursery nurses come in and talk about resuscitation; it could be that in those classes we have a little cookery class” (HMW03)

“um, to come to, to actually do like cookery and that sort of stuff erm, on a budget...So it’s cooking good, healthy meals on a budget really” (CMW02)

13. Being visual and interactive

An extension of 'skilling up' being visual and interactive described the method that dietitians described of delivering education about food and making food choices that resonate effectively within a weight control intervention. Dietitians discussed that utilising visual and interactive activities were effective learning tools and helped contextualise what making certain food choices meant in practice to people engaged in a weight control intervention. One of the community midwives suggested that providing written information for midwives to share with pregnant women may be helpful; reflecting on her learning style as a visual learner.

"I think there's not enough written information. Giving written information would be helpful...a booklet or just talking about healthy eating. I always think about the plate because I am a visual learner" (CMW19)

"I think anything that's visual is really good and one of the sessions that we do is getting people to put on their plates what they would have in terms of pasta, rice, [unclear] and cereal that kind of thing which you could do for pregnant people because there's vaguely the rough kind of energy intake that you use pregnant at various part, times during pregnancy; it doesn't vary massively and actually to put out on the table a day's intake that people could look at it goes down really, really well" (D04)

"...we did y'know oil in jars next to labels to see what it actually looks like when it's measured out" (D04)

"...and again it's very visual and y'know your Pringles next to your vat of oil and you think of lard; we do a lot with lard!" (D04)

"I think sometimes the supermarket tour work quite well. I mean it, it might be what we do is bring loads of labels and stuff that they can look at in a room" (D02)

14. Utilising existent resources

The notion of utilising pre-existent (third party) resources emerged from the data of all groups of health professionals. Utilising the plethora of information and resources that are available via a range of media to support weight control was

identified as an additional tool for supporting healthy eating and weight control in pregnancy and whilst midwives hesitated to recommend some services to pregnant women; dietitians identified that there some internet-based resources were appropriate for supporting weight control and knowledge about healthy eating.

“I think...we use lots of things don't we so we do direct people towards websites and again this is for non-pregnant people so you're looking at things like My Fitness Pal.com which is quite a good one” (D04)

“you can look at things like y'know recipe ideas BBC Good Food magazine because they can put in low fat and whatever and get some ideas erm, they can use the British Heart Foundation booklets that kind of thing along portions and we've developed our own resources as well to give general portion advice” (D04)

“there's a really good online resource as well via NHS Choices... I know I've had quite a few clinic patients that like using online tools... and it just gives them plenty of options for healthy meals, snacks and then once they've chosen the whole weeks erm, weeks' worth of meals and they can choose whether it's for a family or couple erm, it will then generate a shopping list as well” (D03)

“well we've got a very good one for the diabetic but basically its low sugar, low fat and high fibre diet but of course it's actually built around the diabetes side and I think well actually that is a very good diet” (HMW05)

“Well, it's...there's just nothing available really. I mean I would perhaps tend to refer to the GP...If they're sort of saying “I absolutely really need some help with my diet, I mean the other things that's perhaps open is private referral an um...meditation that sort of thing...acupuncture sometimes all those sorts of other alternative avenues might actually help” (CMW02)

“Well you can say to them “Y'know it's gonna have to be a private concern because it's nothing to do with us so I'm not recommending it but erm...” (CMW02)

“Erm, well there's the ones that are available to anybody erm, people pick up Weight Watchers and Slimming World...and people do use those quite a bit and people either get on with them or they don't” (OBS02)

15. Being individualized

Although a small theme in occurrence; being individualized captured the notion that one method of delivering support may not be universally effective or

welcomed. The discourse highlighted that different individuals may have differing needs and that different methods of delivering support succeeded for different people, therefore, having a 'toolkit' of strategies and resources would be preferable in weight management support.

"I think it is a combination and I think the thing it is depends on the person. I think it is always useful to have a toolkit really... that you can pick the bits that work for you because some people are very visual and some people like to read things... and some people are analytical reflectors. It depends on your learning style doesn't it really?" (D04)

"I think it is very, very personal...I think it's like with anything else it's very personal and I think if you can hit the nail on the head then it'll work and if you can't, if you're trying to put your ideas into that person it won't work because you're then just the interfering old bag who comes and you put up a barrier" (CMW01)

"...erm, so things like that [individual differences] all could alter...weight alters the threshold for various interventions of that nature..." (OBS02)

4.3.3 Key theme 3: Influences on uptake and successful weight control

The third of the key themes for this data 'influences on uptake and successful weight control' embodied the experience and knowledge that health professionals discussed in terms of what facilitated and what inhibited successful weight management in an obese, pregnant population.

16. Pregnancy as the agent for or the inhibitor of change?

Health professionals identified the way in which they perceived that pregnancy acted as an agent for or inhibitor of change. As the agent for eating and lifestyle changes, women embraced the opportunity to make changes to optimise their pregnancy outcomes and the health outcomes for their offspring. Conversely, as the inhibitor of change, women felt reticent and unable to make changes because of anxieties about possible outcomes or from a general sense of feeling overwhelmed by change associated with pregnancy already happening to them

coupled with a resolution that they would gain weight anyway. Pregnant women echoed the views of health professionals, with some suggesting that weight gain was inevitable, and therefore they had limited control. Several pregnant women, however, indicated that they would have liked advice and support that they could put into practice post-natally.

"I will try again now but there's nobody to talk to about losing weight when you've had the baby...it would be nice to have some information about losing weight after pregnancy really" (W10)

"I think it is quite a good time for health changes generally and if you can get them tapped into" (D02)

"I think that varies; I think some ladies psychologically they're thinking 'well I'm going to gain weight now anyway' (HMW02)

"I know friends of mine personally who have been told they need to lose weight before they want to try for their pregnancy" (HMW02)

"because even if the women look at themselves and think 'I know I'm obese and I know I'm eating the wrong foods,' I think most of those would like to think...I think most mums would think 'I don't want...I don't want my kids to do that' (HMW02)

"They're at a stage where a lot of these women desperately want their babies...and they want to be in the best possible health that they can be in their pregnancy...so they want to do the best they can on the whole" (HMW07)

"thing is if you are targeting a pregnant woman and okay maybe she might...okay she's not going to lose shed loads of weight or anything but if you educate her about healthy eating she is then gonna feed her child" (HMW08)

"and I think sometimes ladies think that because they're pregnant they're gonna gain weight anyway...so they'll wait until after they've delivered to actually erm, think about what it's doing to their health" (CMW02)

"No...no...I don't know. I suppose it's a sense of trust so they...if they feel that erm, for example, I mean pregnant women might be quite anxious about going to Weight Watchers, feeling that possibly erm...they would be given advice that wasn't particularly for pregnancy" (OBS02)

"It was starting to affect my self-esteem and things and I can't do that but then y'know my baby, my baby comes first but then as long as it is not unnecessary weight. That's what I keep saying to them" (W11)

17. Background and education

The discussion about the effect of background and education on a healthy diet and lifestyle emerged primarily from the discourse across primarily the health professions whom appreciated that individuals from less educated backgrounds were disadvantaged for making healthy lifestyle and eating choices by their lack of knowledge in the area, by lack of exposure to healthy eating practices in their own background and by lack of related skills in the area such as food purchase and preparation skills. Eight of the twenty-five community midwives who participated were from centres located in areas of higher socio-economic status; the remaining seventeen community midwives were practising in inner city low-income areas. As such there were differences between the challenges faced by the midwives in terms eating behaviours and knowledge about food. Notably one of the community midwife focus groups from a rural area of higher socioeconomic status identified that food quality may not in their view have been the predominant contributor to women's obesity in their area which was echoed by the views of two pregnant women living with obesity who held higher levels of education (postgraduate) and professional employment. Conversely, data from the majority of other health professionals whose areas of practice covered a population with low socioeconomic status identified that many of the pregnant women living with obesity that they encountered seemed to have poor food knowledge and understanding and that this, in their view, was a significant influence in their obesity.

"I think for a lot of them out here it's more portion size and plate finishing rather than eating masses and masses and masses of rubbish." (CMW03) (Rural, affluent area)

"I actually enjoy food. That's my whole problem. I love cooking it. I love making it for people. I love the whole social aspect of food. I love cooking with vegetables but it is the amount I eat, that was always my problem...portion size..." (W11) (Postgraduate, professional)

“Education. Some people don’t know. Money is prohibitive...buying lots of things to make something when there’s ready meals etcetera on offer, it’s much cheaper (D03)

“I am really thinking the lower income families here because my caseload is predominantly people that live off takeaways” (CMW11)

“Lots of chaotic lives and having not been brought up with it and not experiencing it and then lots of things going on and chaotic lifestyles and I think it just goes away from them really and just simple tools” (D04)

“I think it [cost] is a barrier as well as maybe just erm you know what you’re used to as well” (HMW02)

“but [name removed] I’m not being funny but you’re the older generation as am I and as are all of us and actually there are a lot of young girls coming through that actually can’t cook” (HMW05)

“you do get the ones that are isolated and have never had a mother figure because we have a lot of social deprivation girls, we get a lot of girls coming through that have been through care in their lives” (HMW05)

“Um, my impression is that in my limited experience that some kids grow up hardly knowing an apple from a pear erm, and then if they’re brought up in a family and then they, y’know become adults and have children themselves, the social question’s...or the norm for them is to eat convenience foods for a huge amount of the time so I suspect that that...sometimes that that, the whole family thing, it’s not just them, the individual” (OBS02)

18. Role of family

The role of family was discussed many times within the data set, across all professions and the discourse of pregnant women living with obesity. The lives of pregnant women were discussed; who health professionals believed that pregnant women were influenced by, and how pregnant women may influence family members regarding eating healthily and weight control. Pregnant women also identified how support or lack thereof from their partners may have affected their own eating behaviour. The support of family was discussed as a facilitator of successful weight control and making dietary changes and conversely, a lack of family support was identified as impeding weight management and adherence to a healthy diet. Health professionals also talked about the potential radiating effect on the family of healthy dietary and lifestyle changes and conversely the

radiating influence on the family of negative perceptions of healthy dietary and lifestyle changes.

I: "What makes it more difficult for you to eat more healthily?" W: "My husband! He sits and eats whatever he wants" (W9)

"He loves food just as much as I do so I think together we could be massive" (W11)

"you can see when the woman is overweight, the bloke usually is as well and you see them the next day pushing a trolley round Iceland with a load of ready meals in it." (CMW03)

"One of my pregnant ladies who is diabetic, had a diabetic referral...and they explained how easy it is to make your own sauce and she was thrilled and she told all of her family and her mum" (CMW06)

"Looking at public health and the issues with childhood obesity actually it's a brilliant time to get started with doing things. We know from research that when they get to five it's almost too late y'know when they're going to school you need to get in there beforehand" (D04)

"It's very much in line with all the government on high guidelines on trying to move through the whole family and the whole lifecycle" (D03)

"It's quite interesting I saw a lady yesterday who came into clinic, she's obese. She came in with her two children who are 3 and 7 and sitting in front of them going "Oh I hate vegetables eugh! I'm not eating them" ...and you are thinking...and so trying to well they won't eat veg...well I wonder why" (D04)

"I think being pregnant myself and then trying to lose weight after and my partner sitting there with a big Toblerone was really hard" (HMW02)

"because even if the women look at themselves and think "I know I'm obese and I know I'm eating the wrong foods," I think most of those would like to think...I think most mums would think "I don't want...I don't want my kids to do that" (HMW02)

"We see many different types of women. We see women who have got a very strong family background so sometimes it's actually what mum says and what mum has done is what happens because mum is very strong female" (HMW05)

"Well that's what the smoking cessation people do, that's why they go to the house because they can get other people in the house and there might be other people willing; it's not just the pregnant" (HMW06)

"thing is if you are targeting a pregnant woman and okay maybe she might...okay she's not going to lose shed loads of weight or anything but if you educate her about healthy eating she is then gonna feed her child" (HMW08)

"and the other thing is that when they've lost weight their family loses weight... (HMW05)

“and indeed the other members of the family may not be at all happy to alter their eating habits so that, that, that...I’m sure that’s one of the problems. If you could transplant somebody into...or if you could change their whole sort culture and the whole family way of eating” (OBS02)

19. Understanding risk: Acceptance and denial

This theme emerged from the discourse of health professionals who identified that the potential risk of obesity and how it may affect maternal and fetal health was not clear to any party; furthermore, even if the risk was explained to women, denial may mediate the acceptance of that risk. Health professionals also talked about the limiting effects of maternal obesity on their own practice and dealing with the increased risk. Women talked about risk particularly about wishing for clarity on how much risk and type of risk and noted that when told that they were at ‘increased risk’ there was not necessarily information on types and levels of risk related to their weight. Community midwives noted both their reservations about overstating risk but also the importance of being clear about risk with women as part of their duty of care.

“Also what I think would be useful would be, tell me the risks about pregnancy but don’t be disproportionate about it” (W11)

“there are so many risks involved with carrying so much weight that they’re not...you don’t want to bombard them with information at booking but the blood clots are told to them at booking so managing your weight in pregnancy is going to be important” (CMW07)

“There’s some written information that came out in one of our policies. It’s a bit lengthy, to be honest and a bit too wordy and I gave a couple of women that...it was really talking about the adverse effect of being overweight and pregnant...some of it may have been a bit too much and a bit too scary” (CMW10)

“I don’t want to scare them but want them to understand that it is important” (CMW09)

“I think it should because ultimately we’re seeing more and more and more women who are obese in pregnancy. It’s becoming more and more common...and you know it does lead to further complications even if they end up having y’know a relatively normal pregnancy delivery becomes more complicated y’know it becomes more high risk” (HMW02)

"it leads to further complications during their pregnancy and increases their risk to diabetes, increases their risk of high blood pressure in and out of pregnancy and in delivery that increases the risk of a larger baby and that brings a whole set of problems of its own and then that y'know...? And then after birth the risk to healing" (HMW02)

"I don't think they realise all the complications that they can come across about how they are limiting themselves; I don't think, for one when we do the dating scans, the twelve week scans we do them abdominally, and this is from our point of view, erm you don't get a clear image when they've got a raised BMI and sometimes they think it's either your fault because you can't you know" (HMW07)

"and when they come in and they're in labour or anything you can't monitor the baby adequately or safely externally because of the large BMI" (HMW07)

"I don't think ladies realise; they know they shouldn't be overweight; they know they should eat healthily but I don't think they realise that at the beginning that we might not be able to [unclear] the baby, we might not be able to hear the baby's heartbeat properly you know you may have obstructed labour; shoulder dystocia, gestational diabetes. I don't think that...I don't know what happens...I don't think all those risks are actually black and white, laid out to them" (HMW08)

"you know...well, it is [name removed] isn't it? You know their body odours are worse; they are more prone to infection y'know they are just massively at risk" (HMW05)

"just because somebody's larger doesn't mean to say that they are going to have a baby that gets stuck or anything you know? Or have huge babies, that doesn't always follow either, and y'know it's...okay, higher risk but what's higher risk?" (CMW01)

"Two percent, ten percent, twenty percent. Nobody actually tells them you know "Your increased risk is two percent" if it is increased risk which is er...non-committal...it doesn't mean anything really because if you've got an increased risk to them it means "it's going to happen" which it's not" (CMW01)

"if they've got a BMI of over forty we would normally refer for an anaesthetic assessment erm...they may need if they've got very high BMI it's another risk factor in the list of things which increase the chance of pulmonary embolism" (OBS02)

"I've had quite a lot of women that have refused to...well told us, asked us not to say their BMI out loud...cos they know it's high. I'm like weighing and measuring and they'll say "just don't tell me and write it on your notes I don't want it on my notes at all; I don't want to know it" (HMW01)

"Denial causes a huge problem. Not calling a spade a spade and not admitting they've got a problem; that's the problem I: that's sustaining the problem?" "That's the problem really. That's where the problem starts because if they are not going to admit they have got a problem there is very little we can do to actually" (HMW08)

“now she was mortified because one of our consultants saw her beforehand; she asked beforehand and said to her beforehand “you are morbidly obese” and said “but we are worried about your baby, you are morbidly obese and we need you to stay in” and she refused to stay in because she’d been upset by this comment which how you think she could get away with it because she knows she’d put the weight back on and she went home and that baby died overnight so she had to live with the fact that she discharged herself. Do...do...d...do you know what I’m saying” (HMW05)

20. Motivation

Health professionals spoke about their belief in the pivotal role of motivation in weight management in an obese, pregnant population; identifying that most people would be aware of their own situation and what they should do to eat more healthily however the likelihood of making changes was contingent on them “wanting to do it”.

“I think they’ve got to want to...They’re at a stage where a lot of these women desperately want their babies” (HMW07)

“Yeah but it has to be that...it has to be with all these things like stopping smoking or taking drugs or alcohol or but it has to be their decision in the end” (CMW01)

“No I think the information’s there I think it’s just erm...it’s like smoking cessation it’s a similar sort of thing really you know they’ve got to really want to do it and it takes a lot of willpower” (CMW02)

“Erm, some would and some wouldn’t. That’s...I know that’s a stupid answer but erm, you get...I suppose it’s equivalent to the smoking where some women recognise the problem and the actually feel in a fit state to do something about it or they want to...they’re motivated and some they, they don’t” (OBS02)

21. Media, marketing and social norms

The role of the media and marketing and its intrinsic link with social norms emerged from the data of health professionals. Media and marketing were discussed by health professionals both as the deliverer of information related to food, healthy eating and controlling weight gain but also as a vehicle for

encouraging unhealthy behaviours. Furthermore, health professionals identified the 'normalising' of overweight and obese.

"A colleague of mine had someone, I think she was around the forty mark, maybe just below but in the high thirties but she said "I'm normal, all my friends are like this" (OBS03)

"I don't think there's much excuse in this day and age with television programmes and media and everything, that people don't know what is healthy food" (HMW08)

"not only that the portions of size have got bigger, where you had two sandwiches before there's now three or four packs isn't there? And so the quantity is more so you feel...oh you're not gonna leave one if you've bought it" (HMW09)

"So do you think you are saying that the value offers are always on the unhealthy food, do you think that is quite a significant factor in MW3: I think it's very significant. I hadn't been into a supermarket for a long time and I went into Tesco's yesterday and I was horrified. The size of the women generally walking round and what was in their trolleys...it's just no wonder that they're so big..." (HMW07)

"but you know I do think that society's got a lot to blame for it. I think that you know you used to go in a shop and the maximum sizes that you could get even places like Marks and Spencer's were a sixteen" (HMW05)

"Actually y'know people...it's become the norm it has very much so" (HMW05)

"I think there should be...There's lots of stuff in the media about slimming at the moment as in like good food and everything but I actually think that that wouldn't be a bad idea because the trouble that gets thrown at us all the time is that you know...that you know you look at media people and y'know they have their babies and then they disappear out of sight" (HMW05)

"they make it...people...unfortunately, it's made in the media that being above a size...eight? Six? Zero? Is fat and actually you wonder do people think "Oh sod it!" (HMW05)

"It's easy to understand but the majority of women will know it because where whichever magazine you open it's got advice about what to eat and what not to eat and different plans and you know lose weight in fifty days and all that sort of thing you know I think the women know pretty much more probably than I do" (CMW01)

"having all that knowledge...I don't think so because in a way it actually instead to having to eat what is normal and moving on with that it...it's very often "Oh well I'm trying to lose weight" (CMW01)

"and you know there is so much on the internet and everything else that if someone is really interested I'm sure that they could get information" (CMW01)

*“The information’s out there in books and it’s on the internet and of course women do access the internet a lot these days don’t they?”
(CMW02)*

4.3.4 Key theme 4: Taking things forward

This final fourth core theme covered the ideas, recommendations, suggestions and views of health professionals and pregnant women living with obesity for taking the research forward in a relevant and useful way. It made suggestions primarily about the nature of a distributable resource but further the development of consistent information to arm health professionals with the knowledge to give appropriate advice and guidance and pregnant women could also access.

22. Creating a consistent message

Midwives and pregnant women consistently identified that advice about what was “safe” to do in terms of managing body weight and weight gain during pregnancy for pregnant women living with obesity was not clear and consistent to anyone. Women reported receiving differing advice from different health professionals, and health professionals stated that there was no clear, consistent advice and guidelines that they could confidently share with pregnant women. Both health professionals and women made a call for the development and universal dissemination of clear consistent guidelines for managing weight gain and body weight in pregnancy across the different weight categories.

“It is difficult because you want to pitch it right and I probably choose different tactics” (CMW10)

“Yeah but again the decision is made by me. I don’t feel it’s erm like it’s part of the bigger plan” (CMW10)

*“I don’t think it matters as long as it is consistent...our care work is about caring for them and their baby but ultimately part of that care package is really like looking at their weight as well these days. You can’t ignore that.”
(CMW10)*

“You know like we do it with the smoking? If people smoke we put in a referral automatically with a smoking midwife and have a named person that anyone with a BMI over 30, they’ll get contacted and just discuss their food...” (CMW11)

“I don’t think we give a lot of standardized information actually.” (CMW17)

“We’re probably not giving the same advice at the same times.” (CMW20)

“There wasn’t really any information, to be honest.” (W10)

“When I went to see the consultant, bear in mind I was there because I had a high BMI, well she told me I shouldn’t put on more than three stone and that was normal. She didn’t quite know the figures and she was going to write to me about what I should and shouldn’t put on” (W11)

“It’s just confusing in the messages that was all” (W11)

“We’ve got a lot of data that shows people quite clearly if you group people into BMIs you know...as you go up your risk of problems is almost exponential” (OBS03)

“I think it’s true. I think there must be lots of information that’s out there that’s not quite right. (OBS03)

“It’s very much we tell you, you need to lose weight, eat healthily, you can lose a couple of stone if you want, goodbye.” (OBS03)

“I’m often printing out Royal College sheets because they do get conflicting messages about whether they can lose weight or not during pregnancy.” (OBS03)

23. Opt out!

Many of community midwives suggested using the smoking cessation model of “opting out” of weight gain advice and would be the best path for midwives to broach discussion and support the control gestational weight gain with pregnant women living with obesity. The discourse of the community midwives suggested that by making receipt of weight management advice an inherent part of the care process, it would de-personalised the subject of controlling gestational weight gain and make it friendlier for women and less complex and personal for midwives to deliver.

“and you’d need it to be an opt-out service like the smoking...whereas if every woman over thirty-five was automatically, so it stopped being quite

such a taboo thing because it's something that happens to everybody.” (CMW03)

“I'd like to go along the lines of an opt-out service like smoking when they get lots of contact, lots of input to make it easier for them.” (CMW05)

“I would probably like a system a bit like if they smoke nowadays everyone is referred and then they take the choice of whether they opt out because at least we could sort of see really where the problem is and how big the problem is and where we need to put our focus and our attention and make it like a really non-threatening sort of thing.” (CMW10)

“You know like we do it with the smoking? If people smoke, we put in a referral automatically with a smoking midwife and have a named person that anyone with a BMI over 30 they'll get contacted and just discuss their food...yeah a bit friendlier” (CMW11)

24. Utilising trigger points

Community midwives discussed the usability of trigger points that existed within their own care process of pregnant women living with obesity as salient points, such as sticking on the new coloured stickers (related to weight category) that go on pregnancy notes of someone who has a raised BMI. Also, referral for a Glucose Tolerance Test, anaesthetic referral and referral to consultant led care were points at which it was possible to broach the subject of body weight and weight gain during pregnancy. Community midwives solely contributed to this theme since it was they that primarily refer pregnant women living with obesity to the appropriate service. It was suggested that trigger points provided a natural point for raising discussion.

“BMI more than thirty triggers discussion because we must offer dietitian but people do not want it...and we must refer for a GTT” (CMW03)

“We do their iron level at twenty-eight weeks so we have a further discussion about healthy eating” (CMW05)

“they always like to know; well almost always want to know how much they weigh” (CMW09)

“We do share that [BMI] and sometimes it has relevance and sometimes it doesn't” (CMW10)

“Or maybe not that booking consultation because we’ve a lot to get in and get them in the service but then the one after that when we do their bloods and just prior to the scan” (CMW10)

“The stickers trigger discussion” (CMW12)

“I’d quite like the opportunity to use it as a springboard onto healthy eating [maternity care]” (CMW18)

“We’ve also got a referral if their body mass index is over thirty to the dietitian which we offer but I don’t find that’s followed up” (CMW20)

25. Developing distributable resources

Community midwives discussed that it would be helpful to have tangible resources such as a simple, relevant, colourful information and tools pack, to give to pregnant women living with obesity. Pregnant women echoed this sentiment and both midwives and women suggested that outlines of BMI and what it means in terms of risks (but in a positive and proportional manner), food and meal ideas, a copy of the Eatwell plate and signposts to other resources would be good to include in the pack and would provide a good trigger for discussion and something for both parties to work from. One pregnant woman suggested that there was also a place for some psychological exercises as her food issues, for instance, were based on her psychology rather than education about food.

“I think if you stuck it in an envelope and then put it in the Bounty Pack I think you are more likely to have people look at it rather than a load of leaflets” (CMW06)

“It’s like Jamie Oliver, this is what you need in your stock cupboard so you don’t have to go out and get it that sort of thing.” (CMW08)

“I hope that if you are doing your degree something good will come out of it to give to pregnant women.” (CMW07)

“and written information that’s easy to read and understand.” (CMW09)

“Maybe there was something on their cards that said something like “discuss your progress at 28 weeks...put some little hearts on it may be like “my baby loves this” type of thing” ...” my baby loves this food” like y’know something to attach a little bit.” (CMW10)

“I’ve often wanted to compile a cheap, simple recipe book that’s got I dunno twenty recipes that are really easy, half an hour meals. Attainable but if we could give out a free book of twenty healthy recipes that were nice, not bland.” (CMW11)

“A little pack that will get them thinking like with the Eatwell Plate and a load of stuff on GI so it’s not about dieting, it’s not about calories, it’s not about, it’s about food choices and where it impacts.” (CMW13)

“I think there’s not enough written information. Giving written information would be helpful...a booklet or just talking about healthy eating. I always think about the plate because I’m a visual learner (CMW19)

4.4 Discussion

This study utilised the theoretical framework that is the predictive model the Theory of Planned Behaviour (TPB) and therefore themes were examined in light of the components of the TPB. Ajzen (1985) suggested that human behaviour was mediated by three key considerations: behavioural beliefs, normative beliefs and perceived behavioural control. Themes that emerged from the data of health professionals could be recognized as contributing to one or more of the three key influences on behavioural intention. Behavioural intention is considered to be the antecedent of actual behaviour and relationships between the experiences and perspectives of body weight and weight gain during pregnancy and the three key components that make up the TPB can be identified. It is argued, therefore, that developing an intervention designed to optimise support for pregnant women living with obesity with controlling their gestational weight gain should be structured around these three components. This intervention in this study was underpinned by the large amount of data gathered from health professionals and pregnant women living with obesity. This intervention sought to change the intention and actual behaviour of health professionals, to increase intention of midwives to support to women living with obesity with gestational weight management.

A relationship between each of the themes and one or more of the components of the TPB was established and this understanding about the way in which each theme is acting on behaviour was utilised in the construction of the behavioural intervention. Themes were therefore grouped and are presented as behavioural determinants (behavioural beliefs/attitude; normative beliefs/subjective norms and control beliefs/perceived behavioural control). Some themes from the data belonged concurrently to more than one of the components of the TPB and therefore appear more than once in the following presentation.

4.4.1 Behavioural Beliefs (beliefs about the likely outcomes of the behaviour)

3. Stretched and limited resources: Health professionals related their awareness that support for body weight and weight gain in pregnancy, lacked sufficient resources. This theme identified that the belief of health professionals about the likely outcome of addressing body weight and weight gain during pregnancy was that resources would be insufficient to be useful. It was suggested therefore that providing an alternative belief about the outcome of addressing issues of body weight and weight gain in pregnancy, in practical terms by providing an accessible resource that they could utilise, could increase the confidence of health professionals about broaching issues of body weight and weight gain in pregnancy with pregnant women living with obesity.

4. Discussion of body weight and weight gain in pregnancy: a mixed reception: This theme identified that there was some question about how well received any discussion about body weight and weight gain in pregnancy may be with some health professionals having experienced some negative and challenging responses. In a survey of 241 midwives in Tayside, MacLeod et al (2012) found that only 15% currently offered weight management advice to obese pregnant women although 77% felt it would be feasible within their role.

Midwives concerns included a lack of confidence in strategies to approach it and a lack of universal advice guidance. Since the response to any discussion about weight management will always be contingent on the individuals involved, altering any belief about the *outcome* of the behaviour (raising the issue for discussion) was not a straightforward solution. It could be suggested instead, therefore, that increasing individual confidence in the *appropriateness* of raising a discussion about body weight and weight gain in pregnancy and equipping individuals with confidence to broach a discussion may increase the likelihood of raising the topic for discussion. Standard six of the quality standard for antenatal care (NICE, 2012) advised that health professionals should offer women with a BMI ≥ 30 at booking, personalised advice on healthy eating and physical activity during pregnancy, therefore, raising the self-efficacy of health professionals to deal with issues of body weight and weight gain in pregnancy sought to increase midwife confidence.

7. The extent and limitation of booking information/leaflet: Health professionals reported that the only standardized information regarding eating in pregnancy had been a healthy eating leaflet that women received at booking which focussed primarily on foods to avoid (for toxicity reasons) and recommendation to eat five portions of fruit and vegetables a day and previously a Pregnancy Book. Both of these resources, however, had disappeared from the service and the Pregnancy Book particularly had been sorely missed as a tool for health professionals and a resource for pregnant women. Pregnant women either reflected this experience or reported receiving no advice whatsoever. It could be suggested that as the only information universally received by pregnant women was a concise summary of general food-related recommendations; this was reflected in the level of attention assigned to dietary behaviour by pregnant women and the health professionals involved in their maternity care. Campbell

et al (2010) noted in a systematic review of behavioural interventions for weight management in pregnancy; that when advice was given to women it concerned healthy eating rather than weight management. Extending attention to dietary behaviour beyond these parameters could be achieved within an intervention training that increased community midwives' specific understanding about the role of body weight, weight gain in pregnancy and therefore the importance of a healthy diet and lifestyle and eating mindfully to control gestational weight gain. It was suggested, therefore, that should community midwives be provided with more in-depth knowledge of healthy eating and lifestyle and its possible impact on controlling gestational weight gain in an obese, pregnant population, it may increase confidence in midwives about broaching the subject with pregnant women living with obesity and therefore increase intention to raise body weight and weight gain in pregnancy.

9. Early intervention: The Global Strategy on Diet, Physical Activity and Health (WHO, 2004) stated that a life course approach was essential in the pursuit of improving public health starting with prenatal and maternal nutrition. Health professionals and pregnant women believed that the earlier any support was received by women, the more beneficial it would be and the greater the likelihood that any changes in diet and lifestyle would be made by women. It would seemed reasonable to suggest therefore that creating a resource that community midwives could use early in pregnancy (midwives suggested from about 12 weeks/booking) could increase the probability of them engaging pregnant women living with obesity with controlling weight gain during their pregnancy and optimise the potential benefits to women and offspring.

10. Being non-judgemental: The behavioural beliefs of health professionals and pregnant women that were related to being non-judgemental were divided

into two variants: a) the belief that being non-judgemental would improve the outcomes of engaging pregnant women with controlling their weight gain during their pregnancy and b) conversely that being judgemental would alienate pregnant women and make them less likely to engage with positive health behaviours. Health professionals recognized that appearing as condemnatory of health behaviours of women only served to dissuade honesty about the behaviour and discouraged women from addressing health behaviours. Giving community midwives a process to follow and a resource to distribute to pregnant women where appropriate, could increase the confidence of the midwives to broach the discussion of body weight and weight gain during pregnancy. It had further been discussed by community midwives who had the greatest contact with pregnant women and made the initial bookings, that making the receipt of weight management advice an opt-out service might make it easier for them to broach and therefore feel less judgemental. Whilst there was some argument for an opt-out approach, the researcher felt that it was not within the capabilities of the research to 'enforce' engagement.

11. Being fun/sociable/peer support: Health professionals and pregnant women expressed the belief that making an intervention fun and sociable would increase engagement and attendance and furthermore provide implicit peer support. Interpreting this in terms of intervention design it could be suggested that group activities could be utilised to deliver elements of the intervention within a team meeting in a relaxed environment that would facilitate the development of friendships and the associated psychological, peer support that health professionals and pregnant women identified as likely to increase the efficacy of intervention.

12. Skilling up: This theme appreciated that lack of practical skills related to healthy eating such as food buying and food preparation presented a challenge to healthy eating and therefore body weight and weight gain in pregnancy. Health professionals and pregnant women expressed the belief that providing pregnant women with the information that would allow them to make choices would increase the probability that they would make healthier food decisions. The inclusion of practical skills such as simple-to-follow recipes in the resource that community midwives in the intervention group could give to women, could increase the belief of the community midwives that their broaching the subject of body weight and weight gain during pregnancy could help pregnant women in their care to make more informed choices regarding diet and lifestyle.

These data suggested that the skilling up of community midwives who expressed some lack of confidence in addressing issues regarding discussion and management weight gain during pregnancy, by giving them standardised information. and by facilitating peer discussion about how to broach discussion and provide support for pregnant women living with obesity, could increase the confidence of midwives in assisting pregnant women living with obesity with managing their gestational weight gain.

13. Being visual and interactive: Dietitians believed that making an activity tangible, visual and interactive worked particularly effectively as an educational tool for making food choices. Their observations were that visualization helped to make food-related information meaningful therefore including materials for the resource that were visually engaging, simple, pictorial and interactive (such as an activity) could make it easier for community midwives to have meaningful discussions about healthy eating with pregnant women and could increase their confidence about discussing healthy eating with pregnant women.

16. Pregnancy as the agent for or inhibitor of change: The belief about the outcome of making dietary and lifestyle changes in pregnancy influences shaped the behaviour of pregnant women. Women who perceived that they were undergoing too much change already with their pregnancy to manage additional changes to diet and lifestyle, and women who lacked confidence in the 'safety' of dietary and physical activity changes, were dissuaded from making changes to manage their weight gain in pregnancy. Conversely, women who viewed their pregnancy as an opportunity and a trigger to make positive health changes because they believed that it would benefit their offspring and improve pregnancy outcomes were more likely to engage with dietary and lifestyle changes to manage their weight gain. As some of the reticence expressed was underpinned by a lack of confidence in outcomes for mother and baby the materials within the resource could allow midwives to share clear, specific and friendly information about the positive outcomes of making dietary and lifestyle changes for both mother and baby with women living with obesity.

It was suggested that providing community midwives with materials within the resource that could answer any concerns that pregnant women may have had about making changes to their diet and lifestyle and could increase confidence of the community midwives about the outcomes of broaching the subject of body weight and weight gain and could improve behavioural belief about discussing and supporting the control of gestational weight gain in pregnant women living with obesity.

19. Understanding risk: acceptance and denial: The understanding, acceptance or denial of risk associated with obesity during pregnancy was discussed by health professionals in two key ways: a) they believed that the acceptance or denial of the risks associated with obesity in pregnancy mediated

the health-related behaviour of women b) the acceptance or denial of risks associated with obesity in pregnancy affected the practice and practice outcomes of health professionals. In the first instance, health professionals discussed their belief that a lack of understanding of or denial of associated risks by pregnant women living with obesity prevented the women addressing the risk by making changes to their dietary and lifestyle behaviours. In the second instance, health professionals recognized that their own practice was more challenging at times when women did not understand or denied the potential increased risk associated with obesity in pregnancy. CMACE/RJOG guidelines for the management of women with obesity in pregnancy (20) recommended: "All pregnant women with a booking BMI ≥ 30 should be provided with accessible information about the risk associated with obesity in pregnancy and how they may be minimised" (p6). Mapping these beliefs about behavioural outcomes to provide simple to understand information summarising the increased risks of obesity in pregnancy that was shared with women living with obesity could increase community midwives' confidence in broaching the subject since it would not be 'personally' delivered.

20. Motivation: The data identified that the role of personal motivation in weight management in an obese pregnant population was believed by health professionals to be pivotal in the uptake and success of managing weight in pregnancy. Teixeira (2005) identified that internal motivation to lose weight and self-motivation were independent predictors of successful weight control. Providing community midwives with motivating information to share with pregnant women, within the distributable resource could contribute to an intention to broach the subject of controlling gestational weight gain as they would be able to offer supportive materials.

24. Developing distributable resources

Community midwives and women suggested that a distributable, readable and usable resource for pregnant women living with obesity would be of benefit as a starting point for controlling gestational weight gain. Some of the community midwives identified that when they did have the printed Pregnancy Book that went out to all women, it did provide a nice, colourful, friendly source of basic information that they could point to with the women in their brief consultation time and therefore women could go home and read it. Midwives felt that they could come back to the book and ask if women had any further questions and therefore the book provided a tool for them. Pregnant women suggested that printed, practical resources would be helpful for them also a basic information which they felt they didn't have regarding what exactly 'risk' was and how much weight they could (or actually **could not**) put on safely, plus some basic guidance about how to make things that were simple, cost-effective and healthy for them and their baby when they were tired and otherwise occupied. It was therefore considered that the development of a simple pack of distributable resources that outlined the basic, clear facts related to higher BMI in pregnancy, weight gain recommendations and then an outline of what a healthy, low GI diet would look like and starting point with a small bank of recipes; would potentially increase the behavioural control of community midwives as they may feel that the information that they were distributing was consistent and accurate and that they would be more confident in broaching the subject of controlling gestational weight gain because they would be able to offer pregnant women some tangible support immediately.

4.4.2 Normative Beliefs (beliefs about the normative expectations of others and motivation to comply with these outcomes)

7. The extent and limitation of booking information/leaflet: Health professionals reported that the only standardized information regarding eating in pregnancy was a healthy eating leaflet that women received at booking which focussed primarily on foods to avoid (for toxicity reasons) and recommendation to eat five portions of fruit and vegetables a day. Pregnant women either reflected this experience or reported receiving no advice whatsoever. It could be suggested that as the only information universally received by pregnant women was a concise summary of general food-related recommendations; this was reflected in the level of attention assigned to dietary behaviour by pregnant women and the health professionals involved in their maternity care. Campbell et al (2011) noted in a systematic review of behavioural interventions for weight management in pregnancy; that when advice was given to women it concerned healthy eating rather than weight management. It could be suggested therefore that if midwives believed that the advice that they were giving to women was standardised across the midwifery population (taking part in the intervention) this may contribute to intention to make the recommendations to women living with obesity and support them with controlling their gestational weight gain.

17. Background and education: The disadvantages experienced by women from less educated backgrounds were reported by health professionals as manifest in a lack of exposure to healthy eating and lifestyle practices and greater difficulty making choices about purchasing healthy food and food preparation during pregnancy. Robinson et al (2004) stated that poor educational achievement relates to poor diet outside of other variables (such as economic circumstances). The dietary quality of young women (20-34 years old)

was scored according to indicators such as amount consumed of fruit vegetables and wholegrain and conversely white carbohydrates, processed and fried foods. Level of education was significantly associated with dietary quality with 55% of women with no qualifications scoring diets in the lowest quarter of scores compared to 3% of women with a degree.

Health professionals reported that where pregnant women have not benefitted from background experiences of healthy eating and healthy food preparation the women's beliefs included perceptions that eating healthily was expensive and that cooking healthily was difficult for example. It was considered that providing community midwives with a resource to disseminate to women that included information about preparing simple, economical meals may contribute to the intention of community midwives to broach discussion with women about controlling gestational weight gain and offer support.

18. Role of family: Normative belief concerning the role of the family operates in two ways a) whether the families of pregnant women living with obesity are willing to support eating healthily and whether body weight and weight gain during pregnancy are considered important to families of women will mediate healthy eating and weight management in pregnancy and b) the dietary and lifestyle choices of women will influence normative beliefs of other family members (such as offspring). Campbell et al (2011) found that women's health behaviours in pregnancy were influenced by the beliefs of partner and wider family and Thompson et al (2011) found a strong positive association between the body weights and health behaviours of pregnant women and their partners. Pregnant women identified that when their partner joined them in their healthy eating plan, they found it easier to eat healthily. Conversely, one pregnant woman and one healthcare professional identified made it much more difficult to

stick to a healthy eating plan when their partners were sitting alongside them eating in an unrestrained manner.

Involving other family members therefore or encouraging pregnant women living with obesity to involve their other family members in dietary and lifestyle changes made by them may increase the likelihood that any changes made will be sustained and furthermore create a different set of normative beliefs about diet and lifestyle for the offspring of pregnant women living with obesity. It could be suggested therefore that within midwifery training encouraging midwives to urge women to include partners and other children in their healthy eating and lifestyle changes and also providing midwives with supporting take-home materials for the pregnant women living with obesity (such as family-friendly meal ideas) may increase midwives' intentions to discuss "including the family" with pregnant women living with obesity.

21. Media, marketing and social norms: Media and marketing create indiscriminate social norms and consequently influence the normative beliefs of health professionals and women alike. Women access health information from the media and friends (Campbell et al, 2011). Since media and marketing are pervasive, social influence is constant however examination and review of resource materials by community midwives in the intervention group may clarify understanding about eating healthily and lifestyle for pregnant women living with obesity. Peer discussion of the materials may, therefore, influence the normative beliefs of community midwives and therefore increase the likelihood of having a discussion about controlling gestational weight gain with women living with obesity.

4.4.3 Control Beliefs (beliefs about the presence of factors that may facilitate or impede the performance of behaviour and the perceived power of these factors)

1. No established path (to support the subject of body weight and weight gain in pregnancy); 2. Path of resources not clear to health professionals;

5. No specific guidance on body weight and weight gain during pregnancy and 6. Discussion of exercise and physical activity in pregnancy:

Health professionals expressed the sense that there was no established path by which to pursue discussion of body weight and weight gain in pregnancy and offer any guidance about managing body weight and weight gain during pregnancy. A lack of standardized direction about the parameters of healthy weight gain in pregnancy and appropriate physical activity and exercise, coupled with doubt about what path of resources may be available to support any recommendations that were potentially made, meant that health professionals felt uncertain about raising and addressing the issue of body weight and weight gain during pregnancy. Campbell et al (2011) identified in a review of thirteen studies that health professionals felt uncomfortable addressing body weight and weight gain in pregnancy, particularly with overweight and women living with obesity and suggested that this contributed to the infrequency and inconsistency of health messages received by women. This notion was supported in a systematic review of dietary and physical activity interventions for weight management during pregnancy where women were found to have reported “confusing, vague and often conflicting” messages from health professionals (Campbell et al, 2011).

The development of the intervention based on the data of health professionals practising within the community and hospital, and pregnant women living with obesity registered at the hospital would create peer development of a strategy for offering support for managing gestational weight gain. Additionally, the

creation of a simple resource (such as a booklet containing healthy eating guidance, healthy and economical recipes, information about the risks of excessive gestational weight gain and benefits of controlling gestational weight gain, for example) was given to community midwives in the intervention group, to share with women living with obesity to support their discussion. It could be suggested therefore that perceived control could be increased by the provision of a clear, standardised process of how to broach the discussion of body weight and weight gain during pregnancy and supporting materials for managing weight gain in pregnancy.

8. Whose responsibility: Belief by individuals that others were responsible for weight gain in pregnancy emerged often in the data of health professionals. Environmental limiters such as time available with patients and lack of a clear path of resources featured in the discussion of health professionals about responsibility for body weight and weight gain during pregnancy.

Midwives, particularly community midwives are the healthcare professional most often seen by women and the data suggested that if there were a greater confidence in the process of offering support to obese pregnant women this may increase the control belief of midwives involved in the maternity care these women. These data also suggested that by empowering midwives with a 'process' to broach the discussion of body weight and weight control during pregnancy this may increase the amount of control that they perceive they have on the outcome of those discussions.

14. Utilising existing resources: It has already been discussed that the absence of an established path for raising issues of body weight and weight gain in pregnancy coupled with a lack of adequate resources contributes to the sense that health professionals experienced that they had little control over options for

managing body weight and weight gain in pregnancy. Health professionals identified that utilising third party support in terms of existent resources provided an additional tool for supporting healthy eating and lifestyle choices. It would , therefore, be useful to include information that could be given to community midwives in the intervention group to share with pregnant women living with obesity which would signpost those women to researched and recommended but readily and freely available third party resources. Data gathered therefore suggested that inclusion of this information in the resource pack for this study's intervention could increase the control belief of community midwives and although not measured in this study, increase the control belief of pregnant women living with obesity utilising the resources by increasing their knowledge base and support tools, many of which also include some online peer support in the form of community users.

17. Background and education: A lack of background education and skills for many pregnant women living with obesity would limit their perception of control that they have over their weight gain in pregnancy. Where pregnant women have not benefitted from background experiences of healthy eating and healthy food preparation their control beliefs have included perceptions that eating healthily was too expensive for them and that cooking healthily was too difficult for example. Including information about simple ways to eat healthily, preparing straightforward, economical meals within the resource materials for community midwives to give to women may increase the intention to broach discussion with women about controlling their weight gain.

22. Opt out! Community midwives suggested using the smoking cessation model of “opting out” of weight gain advice and would be the best path for midwives to broach discussion because it de-personalised the subject of

controlling gestational weight gain and made it less complex and personal for midwives to deliver. Analysis of the data suggested that by the inclusion of an opt-out slip modelled on the smoking cessation slip, for weight gain advice and guidance would take the personal decision of if, how and when to broach a discussion about weight with women. It may be suggested that paradoxically by reducing actual control over the timing and method by which midwives broached the subject of controlling gestational weight gain and making it process driven and consistent; it may increase confidence and sense of control over the issue of advising and supporting controlling GWG with their obese, pregnant caseload. As has been previously mentioned, however, whilst there was some argument for an opt-out approach, the researcher did not consider it appropriate to 'enforce' engagement.

4.5 Summary: Basing the intervention on the consultation data

Data from health professionals involved in maternity care and pregnant women living with obesity served to inform the design of a behavioural intervention for community midwives to enable them to broach the subject and provide advisory support for controlling gestational weight gain in pregnant women living with obesity. Relationships between the data of health professionals and pregnant women and components of the TPB (Ajzen, 1985) were identified in depth and have been reported in this chapter. Utilising the TPB (Ajzen, 1985) to inform the design of the behavioural intervention reinforced the design with a well-validated theoretical framework. The psychological model, the TPB (Ajzen, 1985) suggested that human behaviour was essentially guided by three drivers as described in chapter 3 of this thesis (behavioural beliefs/attitude, normative beliefs/subjective norm and control beliefs/perceived behavioural control). The TPB (Ajzen, 1985) was selected to support this research because according to

the theory, the more favourable each of those beliefs is with regards to the 'desired' behaviour, the greater that individual's intention to perform that 'desired' behaviour will be. This will then, when given a sufficient amount of actual control, increase the actual performance of that 'desired' behaviour. As discussed in the literature review chapters of this thesis, there have been inconsistent and inconclusive findings in previous studies that have sought to manage GWG in women living with obesity, and no robustly successful intervention has been identified. This research had found that both health professionals and pregnant women living with obesity felt that community midwives would be in the optimal position to delivery support/advice to women living with obesity concerning their gestational weight gain, however, midwives had reported barriers to their doing so in these data from Phase One. The barriers reported by midwives included beliefs about outcomes, beliefs concerning important others such as their NHS trust and beliefs about whether they were practically able to offer women living with obesity anything in terms of weight management support. This thesis hypothesised therefore that if these beliefs were addressed within the design of an intervention; coupled with the provision of actual control (again by the provision of the intervention), there would be an increase in behavioural intention and therefore an increase in actual behaviour.

Underpinning this research with a psychological theory provided a framework that allowed for measurable change and therefore not only was it possible to measure change as a whole but it was also possible to identify which beliefs were dominant at different stages (before and after intervention) and in which condition (control group and intervention group). Furthermore, a theoretical framework had facilitated a detailed examination of the beliefs of health professionals and pregnant women living with obesity about a range of aspects to and experiences of obesity in pregnancy. Such detailed examination,

therefore, facilitated the deliberate targeting of those beliefs in all aspects of the design of the intervention. This meant that the design of the intervention, from design to delivery was deliberate and the intervention was informed at all levels, by the data of the target population who had lived experience of the management of GWG in pregnant women living with obesity.

Before data collection began, at the inception of the study, based on the literature reviewed i.e. literature in which all of the interventions had been conducted with pregnant women, the initial thoughts considering the original title of the project “Controlling gestational weight gain in pregnant women living with obesity” were to design a diet and lifestyle programme of some kind for pregnant women living with obesity. The richness of qualitative data resulted in a shift in this original approach precipitated by these data reported in this chapter.

From an intervention design point of view, it emerged from the data that community midwives (who in their practice ordinarily had the most frequent contact with pregnant women that were experiencing a ‘normal’ pregnancy) were willing to offer support with controlling GWG, whilst conversely feeling disempowered to do so. The combination of unanimous willingness to engage with the issue of controlling GWG, and almost unanimous pleas for a resource with which to offer some support to women living with obesity, prompted a rethink about the fundamental design feature of this research; that the research subject should be for the community midwives and not pregnant women living with obesity.

The data from the stakeholders (health professionals and pregnant women living with obesity) during this needs assessment process, suggested that empowering community midwives with a resource to offer support to pregnant women living with obesity, had the capacity to positively influence the dietary

behaviour of pregnant women. The findings from this needs assessment phase suggested that increasing the intention of community midwives to offer support by providing them with a resource that would allow them to follow any discussion with tangible support, may influence a potentially far greater number of women (such as all of the women on a community midwife's caseload) than merely creating a diet and lifestyle intervention delivered to a population of pregnant women living with obesity recruited for the purpose of the research. For this reason, forthwith, the design of the research was focussed on community midwives as the primary deliverers of maternity care.

As significant contributors to the data set, community midwives consistently expressed a wish for some kind of resource dedicated to gestational weight control that meant that they could deliver, at the very least, a consistent message to pregnant women living with obesity about how they could make dietary and lifestyle changes to optimise pregnancy outcomes. Other regular features of the discourse of community midwives concerned their size of caseloads and the lack of time for the addition of supporting gestational weight control to their practice repertoire. It became quickly apparent upon analysis of the data and during ongoing liaisons with the community midwifery teams, that whatever this study designed for application in this setting, it must add value to the practice of community midwives by enabling them to broach the issue of gestational weight control in pregnant women living with obesity but without increasing their workload. Considering these important aspects of the situation, and the in-depth data that were gathered during this consultation, this study decided upon a dedicated booklet that could be given to women identified as obese at antenatal booking by the community midwife. This booklet would the pertinent aspects of body weight in pregnancy and gestational weight management, that had been discussed by health professionals and pregnant

women living with obesity. Furthermore, the views of community midwives about how to introduce the booklet would lead the delivery of this and dictate the intervention period.

Alongside the form of the resource (a booklet), the analysis of data also identified that in the research population, there were some individuals who lacked confidence in their own knowledge regarding aspects of obesity in pregnancy such as the recommended weight gain boundaries for different weight categories, what sort of dietary recommendations to make for managing weight gain during pregnancy and what the actual proportional risks to maternal and fetal health may be in relation to weight category. It was therefore decided at this juncture that a seminar day should accompany the resource for the group of midwives who would form the 'intervention group'. The intention of this seminar day was for community midwives participating in the intervention to first evaluate the contents and design of the resource and give rigorous feedback on it before the final version was submitted to print. The second aim of a seminar day was to discuss the contents of the resource in groups in order to establish that all community midwives who were participating in the intervention, were universally aware of the information in the resource and felt well informed. The final aim of the seminar day was to facilitate a discussion about how community midwives would like to deliver the resource; fundamentally at which point in their antenatal schedule with a woman, they would consider it most appropriate in introducing the resource.

This design had to be revised and the seminar was no longer possible. Major organisational changes within the maternity service and the introduction of the three-month rotation of midwives into different practice bases meant that at the time of the intervention, the changes were still in process. These ongoing

organisational changes made the original seminar logistically impossible for community midwives and researcher at this point. This study had to adapt to the organisational changes that had occurred in the Trust's Maternity Service. As a positive relationship between the two Team Leaders and the researcher had been formed, a decision was taken to consult the Team Leaders and two Team 'Champions' allocated by the community midwives to evaluate and feedback on the booklet design. Appendix 19 presents a decision tree that begins with the organisational change and illustrates the subsequent decisions concerning intervention development and implementation resulting from this change, and appendix 20 an accompanying reflective log excerpt from the researcher's log. Decisions were also taken about when they felt was the optimal time to offer support to pregnant women living with obesity about the resource and what level of follow-up discussion they felt was appropriate to have with women that they had given the booklet to. Finally, the Team Leaders and Team Champions opted to for taking delivery of the booklet when it had been produced, dispensing it to the intervention condition midwives and explaining when and how it was to be used.

By expounding the themes that emerged from the discourse of stakeholders in maternity healthcare in the context of the TPB, the researcher subsequently designed a booklet to address some of the behavioural and control beliefs perceived by health professionals, and the beliefs garnered from pregnant women living with obesity who were consulted during this phase. The booklet also addressed the direct advice on the types of content that had been advised by the midwives as most relevant and useful to have at their disposal in order for them to feel confident in offering pregnant women living with obesity advice and support with managing their weight.

Phase Two of this study reported the development of materials for the intervention (the booklet and the questionnaire) and the pilot trial of the questionnaire, which functioned as implementation (delivery) testing of the questionnaire. Chapter 5 has reported the development of the booklet which was the resource that was developed for the intervention group community midwives to support women living with obesity, with controlling their GWG. Furthermore, chapter 5 explored intervention delivery in consultation with midwives. Midwives drew on their experience and expertise to advise the researcher on their perceived optimal time for them to offer support to pregnant women living with obesity, utilising the resource booklet. Consultation with midwives also guided how the intervention was delivered to midwives in the intervention group; that is who delivered the resource booklets to the community midwives and briefed them on how they were to be used.

Chapter 6, has reported the development of the scale that was developed to measure the components of the TPB in this population of community midwives concerned with supporting women living with obesity to manage their GWG. The final version of this scale was subsequently delivered in Phase Three as the before and after questionnaire for midwives who took part in the study.

Chapter 7, reported the Pilot Trial of the questionnaire and performed two key functions: one was to test all of the items that had been developed from the themes of the Phase One data, in order to see if they were each useful and necessary; the second function was to conduct implementation testing of the questionnaire, that is, what was the most effective way to deliver it? By implementation testing the questionnaire, this allowed the study to identify challenges to its delivery. These challenges to delivery were then addressed in

the delivery of the questionnaire during Phase Three, which optimised response and completion rates.

Phase One of this study reported the needs assessment, and the development of the intervention objectives by identifying what required change, and how this could be achieved. Furthermore, the practical and personal determinants of those intervention objectives were identified from these data. In intervention design methodology terms, these were steps one and two, of the Intervention Mapping protocol (Bartholomew, 2001), and translated the theory into tangible components of the intervention.

4.6 The strengths and limitations of Phase One

Phase One was a substantial qualitative needs assessment which had several strengths, and some limitations.

4.6.1. Strengths

This qualitative phase of the study had good research utility, i.e. it stood alone as a substantive and rigorous qualitative study, and additionally informed the intervention design process throughout the whole study. Yardley (2000) suggested that the 'utility' of a piece of qualitative research should be considered as one of the criteria against which the quality of qualitative research can be assessed. The data gathered in this Phase One of this study were not interpreted in the Thematic Analysis, rather were expounded descriptively, using the TPB framework to underpin the analysis, enabling this study to maximise the utility of these data, during this, needs assessment phase.

Data were analysed rigorously in Phase One of this study to a point of 'saturation', utilising Thematic Analysis (Braun et al, 2006). The researcher was immersed in these data from the point of data collection, through transcription to

analysis to the point of saturation, and implementation of findings into the intervention design and development.

The strength of utilising Thematic Analysis for this phase of the study, lay in its flexibility, i.e. that Thematic Analysis could be applied in a range of theoretical approaches (Braun et al, 2006) This phase utilised both deductive (from the TPB) and inductive coding, allowing the researcher to approach these data with the research questions in mind, which enabled the researcher to focus on which aspects of the data analysis could be utilised in the intervention design and development.

Yardley (2000) stated that quality qualitative research can be enhanced by the 'triangulation' of data collection. In this Phase One of this study, data collection was 'triangulated' by gathering data from a range of sources, namely: focus groups and interviews with pregnant women living with obesity, hospital and community midwives, midwifery care assistants and students, dietitians, and complex case obstetricians. Furthermore, coding was reviewed independently by other members of the research team which included a Registered Dietitian and a Registered Midwife, in order to mitigate any potential bias, thereby strengthening the research quality of this phase.

4.6.2 Limitations

Braun et al (2006) suggested that the flexibility of Thematic Analysis may make it difficult for the researcher to decide what to focus on from their analysis of data, however, this thesis has suggested that in this study, this potential limitation posed by this analytical method was addressed by utilising theory-driven coding in the analysis.

A limitation of this study, discussed in further detail in chapter nine, was that a process evaluation was not conducted. In the scope of a larger study, a process evaluation would have been optimal as Phase One, data could have been utilised to guide the development of process evaluations questions in order to identify causal mechanisms and contextual factors of intervention, however, this was not possible within the resource constraints of the present study.

4.7 The unique contribution to new knowledge, made by Phase One

As a large-scale, qualitative needs assessment exercise, where pregnant women living with obesity, and the health professionals involved in the care of pregnant women living with obesity, were consulted; Phase One of this study provided a unique contribution to new knowledge. A review of the research literature showed that no previous research had Thematically Analysed this breadth and depth of data. In addition, no previous research had used theory (the TPB) to identify both intervention objectives, and determinants of the target behaviour, for a health intervention designed to facilitate community midwifery involvement in managing GWG in pregnant women living with obesity. This study collected the most comprehensive dataset to-date, from fifty-six participants: pregnant women living with obesity, hospital and community midwives, midwifery care assistants and student midwives, dietitians, and complex case obstetricians to whom pregnant women living with obesity were referred.

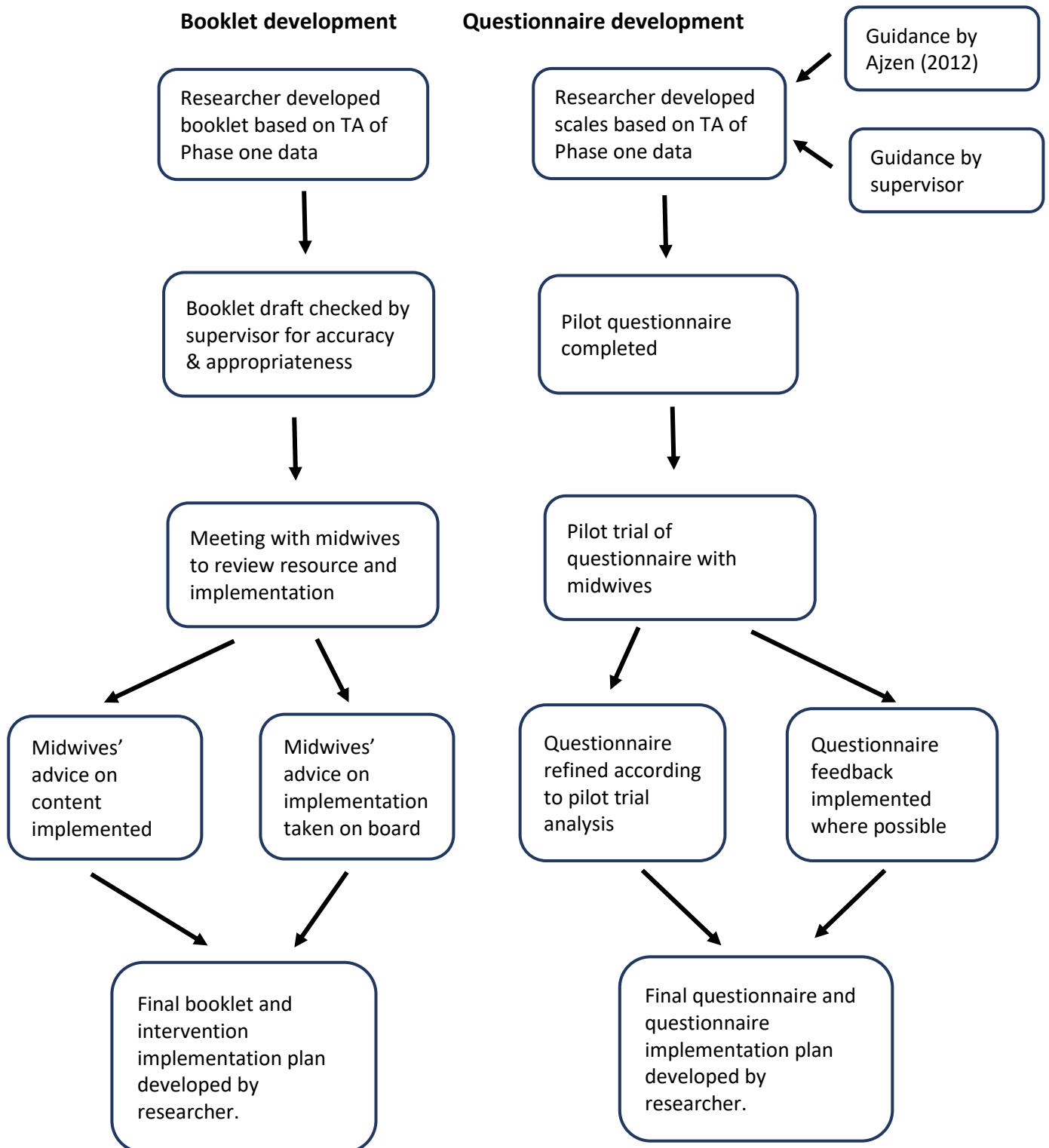
Phase Two: Intervention and implementation design

5.1 Introduction to Phase Two

Phase Two of this study developed the theory that underpinned this research, the TPB (Ajzen, 1985) into the design of the intervention. This process was described in the Implementation Mapping protocol, in steps three and four, respectively (Bartholomew et al, 2001). The design of the intervention in Phase Two included the development of the booklet that was given to intervention group midwives to use with pregnant women living with obesity, to support their GWG (chapter 5); the producing and testing of the research questionnaire (chapter 6 & 7), and the implementation plan, informed by the data collected during Phase One, and the communication link that was formed with the target population (in chapters 5, 6 & 7).

Whilst together forming the intervention and implementation development of this study, chapters five, six and seven also consisted of individual development processes, within those chapters. These development processes for the booklet and the questionnaire were conducted concurrently during the development of the intervention, and are best illustrated by a flowchart, figure 5.1, providing an overview of the process of each. Appendix 21 provides further detail regarding the booklet development, and chapters six and seven have reported questionnaire development and testing.

Figure 5.1: Flowchart detailing the process of intervention development: booklet and questionnaire development



5.2 Phase Two: Developing the intervention booklet based on the Thematic Analysis of the Phase One data

Methodological transparency was important to ensure the quality of the research process (Yardley, 2000), and therefore the steps taken in the development of the booklet, have been presented. Furthermore, the role of other research team members in the development of this booklet has been presented, alongside the steps that were taken to mitigate bias.

The content of this booklet was guided by the data from the Phase One qualitative research. Referring to these data, the booklet was designed to be used by community midwives, in order to support pregnant women living with obesity, and chapter five has presented further details of the booklet's contents.

In order to ensure quality and accuracy of the information in the booklet, it was reviewed in a two-stage process. Firstly the draft of each page of contents was sent to the researcher's supervisor, who annotated the draft, before returning it to the researcher. Appendix 22 presents examples of feedback given.

Yardley (2000) suggested that reflexivity performed an important role in ensuring research quality, including acknowledging the roles of the research team members. The researcher's supervisor (who was a Registered Dietitian) performed as an expert advisor, for much of the booklet's content. She could, therefore, ensure that any guidance with regards to food, or eating, was safe, appropriate, and correct.

In order to mitigate any potential bias that may have arisen as a result of the development of the booklet by the academic researcher and their academic supervisor; the booklet was then reviewed by community midwives who were

drawn from the research population. Maintaining the communication loop with the target research population throughout the development of the booklet, not only served to mitigate potential bias (Yardley, 2000), but also followed the recommendations made by the Invention Mapping protocol, that guides the development of intervention through theory (Bartholomew et al, 2001).

In chapter 4 it was discussed that it had not been possible for all community midwives who would be participating in the intervention to take part in a seminar day concerning the design and delivery of the resource. Facilitating active participation of the community midwives in the design of both the resource and its delivery nevertheless remained one of the guiding principles of this research approach. Due to the lack of availability of the entire research population of community midwives to contribute to the design of the resource for midwives; it was decided that research population representatives would be invited to participate in this stage of the process in the form of two community midwife Team Leaders and two community midwife 'Team Champions'.

As a part of the reorganisation of the Trust's Maternity Service, two Team Leaders remained across the six teams with the remaining re-deployed within the hospital setting. The two Team Leaders were invited to participate in the study and to be involved in all aspects of the design and delivery of the intervention. Furthermore, it seemed important to the researcher and Team Leaders for the teams and their teams' leaders to allocate two 'Team Champions' (one representing the intervention group and one representing the control group) to disseminate the information to the teams in the absence of their Team Leaders. The study, therefore, had two Team Leaders and two Team Champions for the intervention for midwives (the intervention period). The two Team Leaders were contacted via email and invited to participate in this part of

the research with a briefing on the Team Leaders' role and the role of the Team Champions in the development of the resource and delivery. Team Leaders were also given a general outline of how it was envisaged that the intervention and intervention would operate. The Team Leaders were reassured of the flexibility of this idea of how the intervention would operate and the importance of their involvement at every stage of the design and delivery to optimise both appropriateness and usefulness of the intervention for community midwives and pregnant women living with obesity. The process of the development of the resource and the design of the intervention in tandem with the community midwifery Team Leaders and Team Champions is described.

5.3 Using the consultation with Team Leaders and Team Champions to design the resource booklet

The content of the booklet (supplied with this thesis) was informed at all stages by data from pregnant women living with obesity and health professionals that care for them. In Phase One, the thematic analysis of the consultation data generated clear indications of what information should be included in the booklet. This approach, therefore, addressed both the wishes and needs of pregnant women living with obesity and health professionals related to the most useful information regarding managing GWG. Considering the health literacy of the population that the community midwives in this NHS trust were working with, the English used in the booklet was reviewed by the community midwives to ensure that they felt that it was simple and understandable by the women that they were likely to give the booklet to.

The contents page of the booklet (figure 5.2) represented the most pertinent and predominant themes that emerged from the consultation phase. Significantly, the greatest consensus around what was important for managing GWG was seen between the midwives and the pregnant women living with obesity. It could be argued that this may be due to community midwives and pregnant women living with obesity being engaged with the daily, very practical, aspects of pregnancy whereas complex case obstetricians, for example, only see women when they are referred to them with a specific issue or concern.

Figure 5.2: Contents page of resource booklet



The thematic analysis and development of themes have been discussed in chapter four, however, in order to contextualise how the results of thematic analysis have been interpreted into the resource booklet there follows a concise description of the resource booklet sections and how they related to the consultation data.

Eating Well

“Eating well” (p3) (in booklet supplied) “Helping you to gain the right amount of weight during your pregnancy. Some information on the benefits of controlling pregnancy weight gain and what would be the right amount for you” was prompted by the views of pregnant, women living with obesity and health

professionals that it was not necessarily clear what the right amount of weight gain would be for an obese, pregnant woman during pregnancy. This section also addressed the confusion that some pregnant, women living with obesity expressed about the risks to their health and the health of their baby related to obesity during pregnancy. A clear outline of the common risks that are increased in obesity during pregnancy was outlined. Importantly this section was framed positively in terms of health benefits to managing weight as both pregnant women living with obesity and health professionals had expressed negative discussion around obesity in pregnancy during the focus groups and interviews conducted for Phase One of this study. Finally, the IOM and NRC (2009) weight gain range table was presented in reverse order starting with the obese category as this was most pertinent to the reader; both pregnant women living with obesity and community midwives.

Pregnancy Diet

“Your pregnancy diet” (p4); “Easy swaps and top tips” (p6); “Recipe ideas” (p7); “The Eatwell Plate” (p10); “Got the munchies” (p16) and “I can’t face cooking meals” (p17) (in booklet supplied) were all designed to demystify eating healthily to manage GWG and to make it accessible for all. Many of the emergent themes from the thematic analysis expressed the perceived inaccessibility of optimally eating (both in terms of accessibility of foods and understanding about healthy eating) for managing GWG that pregnant women living with obesity experienced. Commonly held views by both women and midwives were that eating optimally was prohibitively expensive, complex and time-consuming. Pregnant, women living with obesity expressed a desire for simplicity in the guidance that they received. Pregnant, women living with obesity and midwives also wanted simplicity and clarity about the essentials of a healthy diet and ‘rules’

that they could follow. Pregnant women suggested simple recipes for those with a limited budget, cooking skills and time. Other ideas included a “free foods” list, a list of foods that could be eaten without worry that it was unhealthy or too calorific and a list of snacks/meals that were nutritionally good when they were tired or busy.

“Your pregnancy diet” explained the key points of a healthy pregnancy diet (NHS, 2015a); simple ‘rules’ to follow. Fundamentally based on a low GI diet (NHS, 2015b), this section explained the main aims of GI eating in plain English to elucidate the healthy pregnancy diet. “Easy swaps and top tips” exemplified the eating principles explained in the previous section in order to demonstrate that it did not require huge and complex changes in order to achieve a healthy, pregnancy diet that would help to manage GWG.

Recipe Ideas

“Recipe ideas” (p7 in booklet supplied) was designed as an introduction to how to eat a healthy pregnancy diet on a low income as the residential population of the Trust in which this research was conducted had an average annual income £1466 lower than the national average (ONS 2011). A greater percentage of resident population aged 16-64 claimed benefits (15.4%) compared to national average (12.5%) (ONS, 2015). These recipes were also utilised as they have few ingredients and were simple to prepare. The recipes were taken from the blog of Jack Monroe a young single parent who sought to feed herself and her child healthily from a £10 per week budget (Monroe, 2015). As well as being a writer who was relevant to women who have to feed their family on a low income; the blog and cooking resource did not require payment or subscription if pregnant women wished to access her huge recipe catalogue. The recipes in the booklet ranged in cost from 28 – 99p per person and were selected as the

kinds of meals that pregnant, women living with obesity during the consultation phase said they would like to see (as many of them had children). The recipes in the resource booklet for community midwives were selected by the researcher from the recipes of Jack Monroe (2015) and were chosen to illustrate how it was possible to cook healthy food that all family members would like to eat, at a cost that was affordable on minimal income and with basic cooking skills and little time.

Portion Size

“The Eatwell Plate” (Public Health England, 2013) (p9, in booklet supplied) was included as a visual representation of portion size as many health professionals and pregnant women living with obesity who took part in the consultation phase suggested that visual material would be helpful. “Got the munchies” (p16, in booklet supplied) was the response to the view, given by many pregnant women living with obesity and health professionals, that it would be useful for them to know what they could eat relatively freely (pregnant women) or that they could recommend as good snack foods to pregnant women living with obesity (health professionals). “I can’t face cooking meals” (p17, in booklet supplied) addressed the frequently mentioned point in the data made by pregnant women living with obesity; that they were either still working and were so tired that they could not face making big meals in the evening. They further explained that some were feeling ‘queasy’ and struggling to cook or that they simply did not have the time or the inclination for cooking a full meal. This section offered simple advice about nutritionally sound small meals that required minimal time and preparation yet would still be appropriate for managing GWG.

Psychological Exercises/Activities

The “Mindful eating” (p18) and “Finding other comforts” (p19) exercises (Royal United Hospitals Bath NHS Foundation Trust, 2012) (in booklet supplied) were included because during the consultation (Phase One) there were pregnant women living with obesity (and midwives) who expressed a wish for something more than just information about diet. Mindful eating had emerged from the Buddhist approach of being ‘mindful’ of one’s actions i.e. taking the time to take notice of what it is you are doing, how it feels, and savouring whatever action it is that you are taking (Nhat Hanh et al, 2011). Mindful eating uses mindfulness to make people more aware of what it is they are eating and when. The “Finding other Comforts” exercise complemented the “Mindful Eating” exercise by asking the individual to think of other pleasurable things that could be done instead of snacking. In the consultation, there were a number of pregnant women living with obesity who had previously lost weight or had undertaken weight management programmes in their past. These women felt that they were well informed about what a good diet constituted however expressed a wish for psychological exercises/activities.

Useful Contacts

Finally, “Useful contacts” (p20, in booklet supplied) addressed the frustration felt by health professionals in the consultation, concerning the lack of resources for them to signpost pregnant women living with obesity to, and the lack of clarity about “what was out there”. This section drew together some key online resources that pregnant women living with obesity and community midwives could access without cost and contact numbers for each of the children’s centres in the Trust area so that women could contact their local centre to see what resources they may be able to access.

The booklet was designed to be bright and colourful and written in plain English. It was informed entirely from its colourful pages to its content, by the thematic analysis of pregnant women living with obesity and health professionals. As it was to be used by community midwives to share with pregnant women that they identified as obese at the start of their pregnancy it was imperative that all aspects of the design were evaluated and feedback was integrated into the final product.

5.4 Implementation meeting with Team Leaders and Team Champions

After initial email contact with Team Leaders, a meeting was arranged with the researcher and the Team Leaders. This meeting was held at the Trust's maternity unit and was attended by the researcher, the two Team Leaders and two community midwives who would subsequently become the Team Champions. The Team Leaders asked in-depth questions related to the study and what the involvement of community midwives would entail.

5.4.1 Concerns and reservations

Team Leaders and Team Champions expressed a number of concerns and reservations concerning the potential involvement of their community midwifery teams in the study. These concerns had already been articulated during the stakeholder consultation. The main concerns were:

1. That the daily workload of community midwives may be increased by participation in the study
2. That the relationship of trust which existed between a midwife and a pregnant woman may be compromised

3. That involvement in the study would be complex and require a large number of additional appointments to attend in order for the study to gather data.

Having expressed specific concerns, it was stated that there were some reservations regarding the involvement of community midwives with the study without if it were not clear that there was a tangible benefit to both community midwives and pregnant women living with obesity.

5.4.2 Resolve and commitment

The researcher outlined the background of the study and clarified that the design of the intervention had been driven by the Thematic Analysis of the data gathered from pregnant women living with obesity and health professionals in the consultation phase. The researcher further outlined that all of the concerns raised during the meeting had been emergent themes from the consultation phase and therefore had been taken into consideration in the design of the intervention:

1. The Team Leaders and Team Champions were reassured that the planned resource (the booklet) was intended to reduce the workload of community midwives. The study involved community midwives introducing a discussion with pregnant women living with obesity around healthy weight gain during pregnancy and then giving the resource to the woman who could then read it at home. The booklet contained useful (and positive) information and activities regarding optimal diet and weight gain during pregnancy. This information would not necessarily be conveyed personally within the time that community midwives have within the usual antenatal appointment time.

2. The Team Leaders and Team Champions were assured that the relationship of trust which exists between a midwife and a pregnant woman had been considered within the design of the intervention. The researcher assured the Team Leads and Team Champions that the discussion of GWG and introducing the booklet to obese, pregnant was entirely at their discretion. The researcher noted that without the maintenance of trusting relationships between midwives and pregnant women any new interventions are unlikely to be successful or long-lasting (Hunter et al, 2008). The researcher stated that the relationship of trust between midwife and woman should always be the most significant factor in whether a community midwife decided to engage pregnant women living with obesity in a discussion about weight and the booklet. The design of the intervention was a 'take home' resource and intended to protect the trusted relationship that a midwife had with a pregnant woman. Having a booklet whose contents covered aspects relating to obesity in pregnancy and managing GWG would allow midwives to disseminate the information in a manner that was non-personal and would allow them to choose their level of involvement with the information.
3. The Team Leaders and Team Champions were assured that every possible effort to minimise inconvenience to community midwives would be taken. It was communicated that in practice the community midwives would need to take some additional time to complete data measures (the questionnaire that was completed by the community midwives) however this should take no longer than thirty minutes, on two occasions (the pre-intervention and the post-intervention time points). The Team Leaders and Team Champions were informed that data were gathered via a questionnaire containing all the measurement scales (TPB constructs and

GSE-6 scale) and that this would be delivered to each community midwife and could be returned in a range of manners, collected by the researcher or posted in a stamped addressed envelope provided.

Following this discussion and information sharing session, and considering all of the concerns and responses that were discussed, the Team Leaders and Team Champions offered their full support and the involvement of their community midwifery teams members and a commitment to encourage participation. Team Leaders offered advice as to which teams would be most appropriate for the intervention group and control group based on team numbers. Team Leaders also volunteered to practically support recruitment by inviting the researcher to recruit during the next monthly community midwifery team meetings. Finally, Team Leaders and Team Champions committed to a further meeting where they would evaluate the booklet and proofread the content, furthermore they would input by making suggestions and amendments that would inform the final booklet, plus they would suggest the best time for community midwives to introduce the booklet to pregnant women living with obesity.

5.5 Evaluation of the booklet proof

The two Team Leaders and Team Champions met with the researcher and were shown the draft booklet. The first draft of the booklet contained the textual material that became the booklet and this was evaluated, annotated and discussed and made changes until all Team Leads and Team Champions were happy for the material to be produced as the final booklet. Changes made included the removal of artichoke from a list of ingredients for a recipe that appeared in the booklet. The advice was given related to the booklet design and included making the booklet pages bright and pictorial which echoed themes that had emerged from the consultation phase. Appendix 23 illustrates some of

the feedback given in annotated draft form, by community midwives, at this stage of development. An excerpt from the notes made by the researcher from this meeting can be seen in appendix 24, whilst appendix 25 shows an excerpt from the researcher's reflective log that discusses the intervention and its implementation. Bartholomew et al (2001) noted that an ongoing information exchange between intended intervention users, and the researcher, should enhance the adoption and implementation of an intervention. Once Team Leaders and Team Champions had annotated their resource booklet draft and discussions had ceased, the booklet was amended and the suggestions were implemented into the final product. Appendix 26 shows excerpts from the researcher's reflective log that details final design finishing touches to the booklet, based on the advice of the document production company

5.6 Advice on introducing the booklet to pregnant women living with obesity

The qualitative data suggested that the booklet should be given to pregnant women living with obesity at the early stages of their pregnancy for best effect, and during this evaluation and design meeting, this issue was discussed. Although the researcher suggested that the initial antenatal appointment (also known as the booking appointment) may be a good time to give pregnant women living with obesity the booklet; the Team Leaders and Team Champions recommended that this was not necessarily the most appropriate appointment. They argued that women receive a large amount of printed information at this point and the booklet may not be read because there is so much new material related to their pregnancy presented to them all at once. There was some consensus that the second antenatal appointment with the community midwives may be more appropriate. The final conclusion reached by the group was that

the second appointment would be the point at which the resource booklet would be introduced to pregnant women living with obesity but some flexibility should be employed by the community midwives and to make best judgements on a case-by-case basis.

The final topic of discussion was the introduction and explanation of the booklet and the study to community midwives. The group decided that the Team Leaders and Team Champions would take delivery of the booklets and disseminate them to their teams. This would allow the Team Leaders and/or the Team Champions discuss the booklets with their teams, explain the content and how they were to be used, including the recommended point of introduction i.e. the second antenatal appointment. The Team Leaders and Team Champions would also discuss with their teams that their participation in the study was encouraged and the Team Leaders and/or Team Champions would answer queries about the study and the participation of community midwives in it. The representatives of the Trust's community midwives had actively participated at all stages of the design process and hereafter took ownership of the resource booklet and how it was to be used within their teams to support pregnant women living with obesity with managing their GWG.

Phase Two: Development of the Questionnaire

6.1 Introduction

Whilst chapters four, five and seven presented a brief outline in their chapter introductions, of the processes involved in the development of each chapter, and then broadened out into a wider discussion about these chapter developments; this chapter, has presented a detailed description of the processes involved in the development of this study's research questionnaire. The author of this study's theoretical framework (Ajzen, 1985) had placed all of the literature, guidance, and tools in order to develop a TPB questionnaire for use in a novel population, in the public domain i.e. the author's website. The author (Ajzen, 2012) had requested that the guidance for developing a novel TPB was followed, and this study, therefore, followed that guidance. Applying these theoretical methods, to develop and pretesting materials, fulfilled steps two and three of the Intervention Mapping protocol (Bartholomew, 2001) and strengthened the evidence-based intervention design.

At this juncture in the study, the researcher requested the support of a further supervisor to the supervisory team, whom the researcher knew had expertise in applying the health psychology theory (the TPB), to health intervention. The role of the novel research team member was that of an expert in the use of the TPB. The new research team member supervised the researcher closely during this stage, as the researcher applied Ajzen's (2012) guidance for the development of the research questionnaire. This research supervisor answered any queries that the researcher had with regards to whether the guidance was being

appropriately and accurately followed in the development of the research questionnaire.

This study acknowledged that in order to fulfil the guidance recommended by Ajzen (2012) to develop a TPB questionnaire for a novel population, the manner in which the scale items in the questionnaire were phrased may seem odd or awkward to the research population. The manner in which questions were structured was guided by Ajzen (2012), in order to apply the theory faithfully to the questionnaire development, this was adhered to. Whilst it was important for quality intervention development, to follow the author's guidance in applying the theory, seeking feedback from midwives on their experience of completing the questionnaire, during the pilot trial (chapter 7) sought to retain the communication loop with target intervention users, as recommended by Bartholomew et al (2001).

6.2 The supporting gestational weight control scale

The consultation and information gathering phase of the study (Phase One) detailed in chapter 4 performed a number of significant methodological functions. These were to inform the design of the booklet, inform the design of the intervention and to provide the data from which to generate the items for the quantitative research instrument; the supporting the gestational weight control, in pregnant women living with obesity, scale. Ajzen (1985) stated that the TPB should be measured by the development of a population-specific questionnaire, with data that were drawn from a small sample of the target population to inform the items for the scale. Initially, items should be developed until the point of data saturation and at which point a pilot of the questionnaire should be conducted to optimise internal consistent and discriminant validity (Ajzen, 1985). As the author of the TPB, Ajzen (1985) instructed that this was the approach that

should be used when operationalizing the Theory of Planned Behaviour. This study adhered to Ajzen's guidance in the choice of measure (the TPB scale) and its development. This chapter will henceforth present the development of the TPB scales, which along with a measure of Self-Efficacy formed the questionnaire, that measured the theoretical components of the research.

6.2.1 Design

The quantitative phase of the study, reported in chapter 8, was a longitudinal design. This tested an intervention, with four of the six trust's midwifery teams; two intervention groups and two control groups. Participants in both conditions received the quantitative measure developed in chapters six and seven, before the inception of the intervention period and following cessation of the intervention. An identical measure was used at both time points with the intention of measuring any change that may have occurred within the theoretical components of the TPB model. No scales existed that measured the components of the TPB in relation to the behaviour of health professionals with regard to their managing GWG in pregnant women living with obesity. It was a requirement of this study, therefore, to develop these scales, in order to conduct this research.

Ajzen (2012) provided extensive guidance on developing scales required to measure the components of the TPB for specific research areas, on his online repository of all of his work in relation to the TPB, Ajzen (2012). The development of this questionnaire, therefore, was guided by Ajzen's instructions for scale constructions.

Ajzen (2012) recommended that scale items should be grounded in exploratory research data, gathered in the form of free answer questionnaire data. This thesis presented this data in chapter four, the presentation of the Phase One

needs assessment consultation. Ajzen (2012) instructed that data should be collected from a sample of the population that will complete the final measure. The study reported in this thesis conducted an extensive consultation and data gathering phase, utilising semi-structured interviews and focus groups where individuals were encouraged to expand and digress from the questions if they felt a was subject pertinent or meaningful to them, therefore, this in-depth and varied data were used for this purpose. Since the design of the intervention was a data-driven process, the participants who contributed to the generation of scale items were heterogeneous in terms of their different health profession or indeed if they were pregnant women living with obesity. It was argued that Ajzen's (2012) suggested homogeneity of contributors to the scale items was however addressed by the participants' unification as stakeholders in the issue of controlling gestational weight gain in pregnant women living with obesity.

Ajzen (2012) stated that it was important to define clearly the behaviour (in terms of target, action, context and time) and the research population. For the purpose of this research, therefore, the behaviour was defined as "the offering of support for controlling gestational weight gain, to pregnant women living with obesity" and the research population were community midwives employed by the Trust.

The Thematic Analysis (Braun et al, 2006) from the consultation and information gathering phase had been rigorous and many themes had emerged from the data. These were sufficient to exceed Ajzen's recommendations for five to six items per scale for direct measures (attitude, behavioural beliefs, normative beliefs and control beliefs) and for eliciting beliefs (behavioural outcomes, normative referents and control factors) which together formed the modal salient beliefs. As advised by Ajzen (2012), for the purpose of scale development as

many items were generated for each component of the TPB as exhaustively emerged from the data.

The initial subscales that were generated for the questionnaire contained a greater number of items than the subscales that formed the final Phase Two research instrument. Items in the subscales were distilled to create subscales that most accurately measured the three constructs of the TPB (attitude, subjective norm and PBC) after piloting the instrument on a sample of the research population. Each subscale was constructed following a seven-point, bipolar, adjective scale format as advocated by Ajzen (2012).

6.2.2 Attitudes

Six themes emerged regularly from the Phase One data and this scale directly applied the words used by health professionals and women living with obesity to represent their attitudes towards aspects of discussion about body weight or notions of support for weight control in pregnant women living with obesity. Four of these six items were word pairings that indicate value terms, indicating that judgments were being made about this subject and these were words that were often used emotively. The remaining two pairings focused on the possible logistics of offering support for weight control in pregnancy. Interestingly there was no one group of health professionals/women living with obesity who used any of these words exclusively; there appeared to be a general consensus across groups (health professions or women living with obesity) in terms of the words used to describe views and experiences around weight control for pregnant women living with obesity. See figure 6.1 for the six items that formed the attitude subscale.

Figure 6.1: All items generated for the attitude subscale.

**My supporting obese pregnant women with controlling their gestational weight gain using
a resource for the next two months would be**

Bad: __ : __ : __ : __ : __ : __ : __ : Good

Easy: __ : __ : __ : __ : __ : __ : __ : Hard

Worthless : __ : __ : __ : __ : __ : __ : Valuable

Supportive : __ : __ : __ : __ : __ : __ : Critical

Harmful : __ : __ : __ : __ : __ : __ : Beneficial

Simple : __ : __ : __ : __ : __ : __ : Complex

6.2.3 Behavioural beliefs

Twelve items assessing behavioural beliefs were generated from the thematic analysis of the Phase One data. Behavioural beliefs concerned what participants thought the outcome of a particular behaviour was likely to be. Many of the themes that emerged from Phase One represented behavioural beliefs. Many health professionals talked negatively about expected outcomes of their currently broaching a discussion about weight with women living with obesity, yet were able to envisage positive outcomes that could be achieved if armed with sufficient resource and opportunities to offer support to this group. As an assessment of belief strength must be the combination of belief about behavioural outcome plus what value that outcome may have to an individual; each behavioural belief generated must have a companion outcome evaluation. If the value of a particular behavioural outcome is not rated highly then according to the theory that behaviour is less likely to happen than if it were highly rated. See (figure 6.2) for an example of a behavioural belief item and its

related outcome evaluation. For the full twelve items of the *behavioural belief* and *outcome evaluation* subscales see appendix 27.

Figure 6.2: Example of behavioural belief item and its outcome evaluation partner item.

Behavioural belief

My using a resource to support obese pregnant women with controlling their gestational weight gain over the next two months will help me to give some meal ideas for weight management in pregnancy

Extremely likely: __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

Outcome evaluation

Giving obese pregnant women helpful guidelines about some meal ideas for weight management in pregnancy is

Extremely good: __ : __ : __ : __ : __ : __ : __ : Extremely bad

6.2.4 Normative beliefs

Although all participants discussed their own normative referents or the normative referents that they perceived others may have, the items for this subscale were not solely developed from the Phase One data. Once the design for the intervention emerged from the data, it became apparent from the data that the optimal research population for this intervention was community midwives. This meant that the normative referents that emerged across the Phase One research population (community and hospital midwives, dietitians, obstetricians and women living with obesity) was not entirely relevant and that the normative referents for this group would be universal, that is bodies within the NHS and midwifery colleagues. As employees of the NHS maternity service, the normative influences for the practices and beliefs of midwives must be to some extent policy led at the local team level, at the national level, as deliverers

of NICE guided practice (2010) and at a personal level by the women in their care. It is for this reason that the six normative beliefs were generated and not expected to change during the Phase Two Pilot trial of the Questionnaire. The *value* that midwives assigned to each of their normative beliefs are represented by items that partner with each belief, known as motivation to comply. The two items in figure 6.3 provide an example of a normative belief for this research population and the motivation to comply with that normative referent. For the full six item *normative belief* and *motivation to comply* subscales see appendix 27.

Figure 6.3: Example of normative belief item and its motivation to comply partner item.

Normative belief

The National Institute for Health Care Excellence think:

I should: __ : __ : __ : __ : __ : __ : __ : I should not

**use a resource to support obese pregnant women with controlling gestational weight gain
in the next two months**

Motivation to comply

**Generally speaking, how much do you want to do what the National Institute for
Healthcare Excellence thinks you should do?**

Not at all: __ : __ : __ : __ : __ : __ : __ : Very much

6.2.5 Control beliefs

The Phase One data generated far fewer items for control beliefs than for either behavioural or normative beliefs. There was sufficient Phase One data related to the participants' beliefs about their own control in relation to managing weight gain in pregnancy (that is the control beliefs of midwives, dietitians, obstetricians and women living with obesity who took part in Phase One), however for the purpose of Phase Three, the data that could be associated with control beliefs

specific to the Phase Three research population (community midwives) was focused around fewer areas of relevance. Control belief items described the amount of control that community midwives felt that they may have over aspects of supporting gestational weight control and the power of control factor items represented the value that a control factor may have for the participant. See figure 6.4 for an example of a control belief and its related power of control factor. For the full, six item *control belief* and *power of control factor* subscales see appendix 27.

Figure 6.4: Example of *control belief* item and its *power of control factor* partner item.

Control belief

I expect that I will be able to offer a supportive resource about controlling gestational weight gain to obese pregnant women in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

Power of control factor

Offering a supportive resource to obese pregnant women would enable me to support them with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : Completely disagree

6.2.6 Summary

Phase One of the study produced rich and expansive data that informed the generation of a large number of items with which to measure the components of the TPB in the Phase Three research population; community midwives. Emergent themes elicited the language pertinent to the constructs from the data of the stakeholders (health professionals and women) in managing weight control in pregnant women living with obesity. The Phase Three research population (community midwives) dictated the normative referents for the group,

however, these referents also emerged from the data of the wider research population consulted in Phase One. As it was important for each item to represent the theoretical constructs of the TPB this initial scale was subsequently tested on a sample of the research population (midwives) in the Phase Two Pilot Trial of the Questionnaire (Chapter 7) and items were distilled to produce a scale that optimally assessed the theoretical constructs of the TPB in relation to supporting gestational weight control in pregnant women living with obesity. This refined scale was used as the quantitative research instrument for Phase Three (the intervention phase) of this study.

6.3 The self-efficacy scale

Phase One data reported that community midwives would be resistant to any aspect of taking part in the research that may add significant amounts of additional time to their normal practice. All community midwives who were considering participating in the study were fully informed of the time required for their participation in the study, therefore, all community midwives who chose to participate accepted and were prepared for the additional time that would be required in order to complete the research questionnaire. It was therefore, decided that a well-validated, shortened version of the original Generalised Self Efficacy Scale (GSE) (Schwarzer and Jerusalem, 1995) would be used in this thesis, to minimise the inconvenience to community midwives who participated in Phase Three.

The full-length Generalised Self Efficacy Scale (GSE) (Schwarzer and Jerusalem, 1995) numbered ten items. Romppel et al (2013) assessed this scale using a sample of over 19,000 participants, from 26 countries, to build a short form of the scale of six items. Their short form scale GSE-6 (figure 6.5) was then tested for psychometric properties, concurrent and predictive validity in

a healthy population of >14,000 participants and concluded to be a valid measure of GSE with statistical analyses indicating alphas that were comparable to the original scale. The brevity and validity of the GSE-6 deemed it to be an appropriate measure of self-efficacy for this study and would help to minimise the number of items in the research instrument. The GSE-6 was scored in the same manner as the original scale with participants asked to rate the extent to which each item applied to them on a scale ranging from “not at all true” (1) to “exactly true” (4) and item scores were summed. Figure 6.5 presents the GSE-6.

Figure 6.5: Generalised Self Efficacy scale short form (GSE-6).

If someone opposes me I can find means and ways to get what I want

Exactly true: ___ : ___ : ___ : ___ : Not at all true

It is easy for me to stick to my aims and accomplish my goals

Exactly true: ___ : ___ : ___ : ___ : Not at all true

I am confident that I could deal efficiently with unexpected events

Exactly true: ___ : ___ : ___ : ___ : Not at all true

Thanks to my resourcefulness, I know how to handle unforeseen situations

Exactly true: ___ : ___ : ___ : ___ : Not at all true

I can remain calm when facing difficulties because I can rely on my coping abilities

Exactly true: ___ : ___ : ___ : ___ : Not at all true

No matter what comes my way, I'm usually able to handle it

Exactly true: ___ : ___ : ___ : ___ : Not at all true

Source: Romppel et al (2013).

The measurement of self-efficacy was included in Phase Three in order to measure whether the provision of a booklet to community midwives and influenced the self-efficacy of community midwives concerning their capacity to support gestational weight management in women living with obesity.

Phase Two: Pilot trial of the questionnaire

7.1 Introduction

Chapters four, five and six detailed the Phase One consultation phase, the development of the content of the booklet, the design of the intervention and the content of the questionnaire that was completed by community midwives. Whilst the participation in this study of midwives, pregnant women living with obesity, and the health professionals caring for those women suggested that the questionnaire should have a good face and content validity, nevertheless, it was important to undertake a pilot trial of the questionnaire.

This pilot trial carried out important aspects of the intervention development, i.e. ensuring that the research measure, the study's questionnaire, was fit for purpose. According to the Implementation Mapping protocol (Bartholomew et al, 2001), in order to apply a theoretical framework appropriately and accurately to a health intervention, step 3 involved the producing and 'pretesting' of intervention materials, and step 4, the implementation planning, with intervention users forming part of that process. This study's pilot trial pre-tested, and refined the study's questionnaire according to these findings.

The pilot trial was conducted on a subset of the community midwives to test all elements of both the questionnaire and the procedure. "Conducting a pilot study does not guarantee success in Phase Two but it does increase the likelihood of success." (van Teijlingen et al, 2002, p33). Van Teijlingen et al (2002) suggested that piloting a questionnaire that had been developed for midwifery research would show up problems that would only become apparent from a pilot, and that changes could be made based on the pilot.

Piloting the questionnaire, reduced the subscale items to those which were found to measure the theoretical construct effectively. Furthermore, piloting allowed refinement of the practical procedure for conducting data collection from the community midwives using the questionnaire, improving the feasibility of the administering of it. Securing the view of the intended intervention users, of their experiences of completing the questionnaire sought to mitigate bias where possible. Applying reflexivity to this stage of the study, this study acknowledged that questionnaire's scale items were developed in an academic study, by the researcher, supported by an expert supervisor, and developed according to the guidance of the theory's author (Ajzen, 1985, 2012). These aspects of the questionnaire design were important for the development of the accurate application of the theory (Bartholomew et al, 2001), where possible, however, for lay users of the questionnaire, this study maintained an awareness that structure of questionnaire items may be unfamiliar. It was important to this study that the midwives perceived the questionnaire as usable and fit for purpose, and therefore their views on the questionnaire were imperative. Although there were limits to how much scale items could be amended, if particular items proved to be very challenging for midwives to understand, this study sought to address this issue in the final version of the questionnaire. Analysis of the data gathered from the questionnaire was used to test validity, reliability and also to test the process of conducting MLR on this data, and amendments to the final version questionnaire were made, based on these tests.

7.2 Recruitment of community midwives for the pilot trial of the questionnaire

A meeting was held with the Interim Matron for Postnatal and Community to discuss details of the proposed intervention including: how community midwives

would be recruited; how much time participation in the study would require of community midwives and what would be required of the community midwives as a member of the intervention or control group. The Head of Community Midwives was given a copy of the proposed questionnaire. This was shared and discussed with the Head of Midwifery to ascertain endorsement for the study. Once obtained from the Head of Midwifery, the Interim Matron for Postnatal and Community emailed a covering letter for distribution to community midwives to be recruited for the pilot trial of the questionnaire, and a copy of the draft questionnaire. The Interim Matron for Postnatal and Community explained to all midwives that this was a pilot exercise and an opportunity for community midwives to give freely of their views regarding the study and the questionnaire. The email was sent by the Matron in order that all community midwives were aware that their participation in this exercise was endorsed and encouraged by the Interim Matron for Postnatal and Community, Head of Community Midwives and the Head of Midwifery.

As reported in chapter five, four midwifery teams were to be made available to the study via their gatekeepers (Community Midwifery Team Leaders) to take part in the intervention phase, Phase Three. The four midwifery teams constituted a total of forty midwives who could potentially be recruited to take part in Phase Three of the study. A total of ten midwives were successfully recruited for the Pilot Trial. Ten Pilot Trial participants represented 25% of the possible maximum of midwives who could be recruited for Phase 3 and therefore this thesis suggests that 25% would represent a satisfactory percentage of the possible sample size for Phase Three, that amendments to the questionnaire based on the results of the Pilot Trial of the questionnaire would be appropriate.

There were some initial challenges to recruitment, however, the Pilot Trial served to provide valuable insight into those challenges and how they might be addressed. Accordingly, steps to maximise recruitment were taken.

7.2.1 Challenges to recruitment and maximising recruitment

After two weeks there had been two responses. The Matron issued a reminder on behalf of the researcher with an extended deadline and this resulted in one further response. There are known barriers for clinicians participating in research including time constraints and a lack of support as identified by Alterline Research (2014) therefore in a bid to identify and address the barriers to participating in this pilot trial, observation of the working/practice environments the community midwives were undertaken. This observation gave an insight into midwifery practice with the community and informed the researcher with useful information. For example, upon arriving for their working day, community midwives had an exceedingly short amount of time at shared computers in which to obtain the information they needed for their working day; they then went straight into appointments. Reviewing the online questionnaire that had been sent via the NHS webmail system by the researcher highlighted that the format of the scales contained within the questionnaire was frequently altered by the NHS webmail security system and it was therefore not simple to complete. Furthermore, it was unclear how to return a completed questionnaire via the NHS webmail system. This was further highlighted when two of the questionnaires returned by the NHS webmail system were format corrupted and it was uncertain which of the possible responses to the questions had been indicated on the returned questionnaires. It was considered that the combination of the limited access that community midwives had to their NHS webmail and the complexity of completing and returning the questionnaire was a significant

disincentive to community midwives' participation in the pilot trial of the questionnaire. Furthermore, the difficulty in reading the returned questionnaires when the format had been corrupted altered by the NHS webmail system meant that the decision was made to disregard the three responses returned and a different approach was required.

Permission was sought from the Interim Matron for Postnatal and Community and given to the researcher to visit five of the Community Midwifery Teams in the trust. The Interim Matron for Postnatal and Community informed the five Team Leaders of the researcher's request for them to participate in the pilot trial and assist in the completion of the trial of the questionnaire. Of the five Team Leaders, three responded and questionnaires for each community midwife within the team were left at the Children's Centres which were the Community Midwives bases, plus a sealed response box for them to post completed questionnaires into. After one week these boxes were collected by the researcher. Using this strategy there were seven responses received by this method. The third Team Leader who responded suggested that the box system would not work for their team of community midwives as they worked from several locations. Therefore, a further strategy was employed with the Team Leader for this team. The Team Leader was sent the questionnaires for each of the community midwives in her team and she distributed these to them with self-addressed envelopes for return to the researcher. There were no responses by this method.

A further meeting with the Interim Matron for Postnatal and Community concluded that contact should be made directly by the researcher who would send a postal copy of the questionnaire to each community midwife, with a covering letter section (appendix 27) explaining the purpose and value of

participating in a pilot trial of the questionnaire and a stamped addressed envelope for return to the researcher. To maximise response rates, strategies recommended by Edwards et al (2007) and Cook et al (2000) were employed (questionnaires were one-sided, posted in white envelopes with a return SAE). A better response was anticipated by using this method as Baruch (1999) and Cook et al (2000) found that 56% could be anticipated for the traditional mail questionnaire compared with 40% for an electronic email response. A reminder letter was sent two weeks later. Three responses were received by this method, making a total response of ten participants for the pilot trial of the questionnaire.

7.3 Pilot trial of the Questionnaire results

7.3.1 Supporting the control gestational weight gain scale: The TPB scale

The face validity of the TPB scale was established by considering whether community midwives had completed the scale correctly. This was assessed by examining for consistently missing items or items where more than one response was given. It was found that all participants had. There were no items consistently omitted and no items where more than one answer was given which suggested good content validity.

Reliability analyses were conducted to test the internal consistency of the subscales that constitute the TPB scale. The subscales that constitute the TPB scale were: attitude, behavioural belief, outcome evaluation, normative belief, motivation to comply, control belief and power of control factors. Items that constituted the pilot questionnaire TPB scale, are presented in appendix 27. Cronbach's alpha was utilised in order to examine whether the items within the same subscales were measuring the same construct. The corrected item totals were then considered for each item in the subscales and corrected item totals were considered acceptable at ≥ 0.5 . With a larger sample, smaller corrected

item-totals would be acceptable (Field, 2005) however the sample for the pilot was small and therefore a larger corrected item-total was desired. If the corrected item-total fell significantly below 0.5 and the subscale alpha was increased by the removal of the items, then this item was considered for removal. Appendix 28 details the rationale for items that were removed from the subscales as a result of item analyses in the questionnaire pilot and includes a copy of the corrected-item totals and Cronbach's Alpha if item deleted for all subscales. Table 7.1 illustrates the Cronbach's alphas for each subscale, indicating good internal consistency in each of the subscales.

Table 7.1: Subscale alpha coefficients for Supporting Gestational Weight Control

Subscale	Alpha coefficient
Attitude	0.777
Behavioural belief	0.779
Outcome evaluation	0.514
Normative beliefs	0.907
Motivation to comply	0.928
Control beliefs	0.783
Power of control factors	0.861

The pilot trial of the questionnaire and the subsequent item analyses were undertaken to refine the scale by reducing items to achieve the optimal scale for the measurement of the theoretical constructs. As aforementioned, items were removed from the scale if they had poor corrected items totals and where the subscale alphas were significantly improved by removing the item. Table 7.2 indicates the numbers of items in each subscale that constituted the final TPB scale.

Table 7.2: Number of items (questions) in each subscale that constituted the final TPB scale

Subscale	Number of items (questions)
Attitude	5
Behavioural belief	8
Outcome evaluation	8
Normative beliefs	6
Motivation to comply	6
Control beliefs	5
Power of control factors	5

In order to investigate further the relationships between the variables, the relationships between the theoretical constructs and their direct measures were investigated using bivariate correlation (appendix 29). There were large, statistically significant correlations between attitude and behaviour beliefs ($r = -.885$, $p < .01$) and subjective norm and normative beliefs ($r = -.917$, $p < .01$) and a large correlation between perceived behavioural control and control beliefs ($r = -.619$, $p > 0.05$) but this was not statistically significant. Although the relationships between two of the theoretical constructs (attitude and subjective norm) and their direct measures (behaviour beliefs and normative beliefs) were statistically significant it was difficult to make robust inferences from these analyses as it was a small sample size $n = 10$ and effects were, therefore, more difficult to detect. Since the purpose of the pilot trial was to statistically analyse a small sample and to test the procedure for Phase Three, in order to generate as much information as possible, investigations of the items within the questionnaire were undertaken. This further analysis included a Multiple Linear Regression (MLR) as a trial of the predictive capabilities of the TPB to predict intention of community midwives to support pregnant women living with obesity with controlling their GWG.

Prior to conducting MLR the assumptions were tested resulting in an independence of residuals as assessed by a Durbin-Watson statistic of 2.503.

Examination of the partial regression plots (appendix 29) indicated that all relationships between variables were linear and tolerances values for attitude, subjective norm and perceived behavioural control indicated that there were no multicollinearity issues for this analysis (tolerance = .618, .650, .530 respectively). Examination of the histogram (appendix 29) indicated that data were normally distributed. Exploratory Pearson's Product Moment Correlation Coefficient (Pearson's r) was conducted. Table 7.3 displays the correlations between the constructs of the TPB and intention to support gestational weight control.

Table 7.3: Correlations between Theory of Planned Behaviour constructs and intention to support

Theoretical component & Direct measure	Correlation
Attitude & Behavioural Intention	$r = -.466$ $p > 0.05$
Subjective Norm & Behavioural Intention	$r = -.497$ $p > 0.05$
Perceived Behavioural Control & Behavioural Intention	$r = -.708^*$ $p < 0.05$

**Significant at the 0.05 level (2-tailed).*

A statistically significant correlation between perceived behavioural control and intention to support was seen ($r = -.708$, $p < 0.05$). The results from the MLR (table 7.4) showed that the model in this pilot questionnaire was not a significant predictor of community midwives' intention to support obese, women with controlling their GWG and none of the TPB constructs were independent predictors.

Table 7.4: Multiple Linear Regression between Theory of Planned Behaviour constructs and intention of midwives to support pregnant women living with obesity with controlling their gestational weight gain

Group	Model Sig.	Adjusted R Square	Attitude Sig.	Sub Norm Sig.	PBC Sig.
Pilot	.199	.271	.917	.726	.170

The MLR was conducted on the pilot data primarily to test the process of entering and analysing the data gathered by the questionnaire and significant results concerning the model were not expected. Although there are no set rules for the sample size for conducting MLR, however, Field (2005) suggested that there should be $n = 10$ participants per predictor variable. As the sample size for the pilot was $n = 10$ nothing about the predictive capabilities of the TPB on behavioural intention was inferred from the MLR in this pilot trial.

7.3.2 Review of the Multiple Linear Regression analyses

Although the results of the bivariate correlations and MLR at this stage did not necessarily produce robust results on the predictive capabilities of the model, conducting MLR indicated that data gathered at this stage was normally distributed and conformed to the assumptions of the test, confirming the robustness of the questionnaire items. The pilot trial also provided a clear indication of the challenges related to recruitment of community midwives and demonstrated the most effective way to engage community midwives with the study was personal visits and individual delivery to each community midwife of paper-based questionnaires. Face and content validity was confirmed and item analyses finalised the questionnaire which retained the subscale items that most effectively measured the theoretical. This resulted in a shorter questionnaire which had the potential to increase the likelihood that community midwives would complete it.

7.3.3 GSE-6 General self-efficacy scale short form

As described in detail in chapter 6 (Instrument Development) the CSE-6 is well tested and validated across many populations and in many languages (Romppel et al, 2013); it was not necessary to run any exploratory tests on the CSE-6

scale. A reliability test was undertaken (Cronbach's alpha) since although used on many health populations (see chapter 6), this GSE-6 scale had not previously been utilised to investigate community midwives and the issue of GWG in pregnant women living with obesity. The results showed a Cronbach's alpha ($\alpha = .928$) suggesting that this scale performed reliably in this sample of community midwives.

7.4 Pilot trial of the questionnaire summary

The process of rehearsing the methods, recruitment, procedure and analyses that were proposed for the Phase Three was invaluable for planning and preparing for the challenges that were faced ahead. These included accessing and recruiting community midwives to participate in the research, and refining the method of delivery of the questionnaire. The methods that would optimise the engagement of community midwives, whilst minimising inconvenience to them and the best approach to recruitment and delivery of the questionnaire and intervention were identified.

The purpose of this pilot was to test methods and utilise the data of the $n=10$ community midwives to identify which items from the TPB subscale items developed for the questionnaire were less effective. Two of the community midwives commented on items in the subscales that were unclear to them and their discomfort with particular items was supported by poor corrected item totals and therefore these items (questions) were removed from the questionnaire. An example of the feedback from midwives about individual questionnaire items can be seen in appendix 30.

Community midwives had also been asked how long it had taken them to complete the questionnaire and this information used in Phase Three to indicate a realistic time that the researcher and community midwife needed for the

completion of the questionnaire (appendix 31). At every opportunity, the involvement of the Maternity Service was sought regarding advice, views and support for design and delivery of the study, adhering to principles of Intervention Mapping (Bartholomew et al, 2001) as much as was feasible. The Pilot Trial presented an ideal opportunity for the community midwives, Interim Matron for Postnatal and Community, Head of Community Midwives and the Head of Midwifery to contribute to the further development of both the questionnaire and the intervention itself. The method and results for Phase Three have been presented in “Predicting community midwives’ behavioural intentions and actions to support gestational weight control in women living with obesity”.

7.5 Summary of Phase Two

This thesis has reported the development and implementation of an intervention for midwives that sought to facilitate the involvement of midwives in supporting pregnant women living with obesity with controlling their GWG. Utilising a mixed-methods approach, Phase One and Phase Two together formed the intervention development phase which prefaced Phase Three, the implementation and evaluation of the intervention. Phase One generated a wealth of qualitative data from which this study was able to inform all aspects of the development of the intervention during Phase Two. In Chapter 5, the process by which the emergent themes from the Phase One data were utilised to inform intervention design, content and implementation was described. Midwives played a central role throughout the entire process and participated in the research through to the revision of the booklet to its final version. Concurrent with this development of the booklet, was the development of the TPB scale for community midwives (Chapter 6), that was structured according to Ajzen’s (2012) TPB guidance on

developing a scale to measure the components of TPB. As guided by Ajzen (2012), exploratory, qualitative research had been conducted in order to inform the scale item content (Phase One) and during Phase Two, these qualitative data were integrated into the questionnaire. Chapter 7, presented the pilot trial of the questionnaire which tested the planned design and delivery of Phase Three, the testing of the intervention. Conducting a pilot trial gave the opportunity for crucial aspects of conducting the research to be tested, such as recruitment of participants and the delivery of the questionnaire. The pilot trial also tested the research measure that was developed for this study that is, the TPB Scale. The pilot trial of the questionnaire supplied the rationale for items from the TPB scale to be removed, thereby making the scale both less burdensome to the participant, as well as optimising the robustness of the scale. The final questionnaire that was utilised in Phase Three can be seen in appendix 32. Alongside the revision of the questionnaire, the important lessons that were learned from the pilot trial regarding recruitment and retention of participants and the delivery of the questionnaire were integrated into the delivery of Phase Three. Alongside the quantitative item testing, midwives again played a central role in the process of the questionnaire development. Not only by providing the quantitative data by which to conduct item testing but also by feeding back on their own experiences of completing the questionnaire.

Grounding Phase One and Phase Two in the data of midwives, pregnant women living with obesity and other health professionals involved in their care, and developing and evaluating the intervention design alongside the research population was a guiding principle of this study. Both in the reviewed literature and in the Phase One qualitative data, it had been established that there were challenges for midwives in offering support with GWG to women living with obesity. By involving midwives in all aspects of the intervention design, this

study sought to address those challenges and create an intervention that was feasible and acceptable for midwives and facilitated their involvement in supporting women living with obesity with managing their GWG.

7.6. The strengths and limitations of Phase Two

7.6.1 Strengths

The communication link between the researcher and target population, i.e. the community midwives, had been formed during Phase One of this study, and was maintained throughout the entire duration of this study. Bartholomew et al (2001) recommended that this aspect of Intervention Mapping was established by the start of intervention development and that this interaction would guide and inform the implementation and adoption of the intervention; guided by the intervention's intended users. The impact of this communication link between the study and midwives was that the views, experiences and expert knowledge of the midwives informed the development of the intervention. Furthermore, the communication link between the researcher and the midwives meant that collaboratively they were able to find ways of overcoming the barriers to conducting the research that resulted from organisational change.

Phase Two, of this thesis reported the design of the intervention, the plan for its implementation; as recommended by steps three and four of the Intervention Mapping protocol (Bartholomew, 2001) This study effectively utilised the relationship that had been established between the researcher and the midwifery service, early on in Phase One of the study, in order to guide the design, and implementation of the intervention during Phase two, that was tested in Phase Three.

The Pragmatic Approach (Dudovskiy, 2018) taken by the research, allowed this study to adapt to emerging issues in the local setting, such as the significant organisational changes that affected midwives' working pattern, and resulted in a reduction in a number of midwives in the Trust. The researcher had fostered a relationship with midwives in the Trust and maintained a communication loop as recommended by Bartholomew et al (2001), throughout these changes to the Trust's midwifery service. This positive relationship between the researcher, the study, and the midwifery service meant that Midwifery Team Leaders sought to find ways to work alongside the researcher and support the intervention development, around the emerging changes to the service.

It was a strength of this phase that the continued involvement of midwives in the intervention development ensured that the booklet, and the intervention measure, i.e. the questionnaire, which were developed during this phase, were both reviewed by the intervention users. This mitigated potential bias, that may have existed had the booklet and questionnaire been reviewed and developed by the researcher alone and increased validity.

The booklet that had been developed during Phase Two alongside midwives, was reported to the researcher as "liked" and "used" by midwives, and the researcher received requests for any booklets that may still be available to be distributed to the community midwifery teams, at the cessation of the study. This has been discussed further in chapter nine "Impact of the Study". It was a further strength that the booklet that was developed as part of this phase, was accessible for pregnant women who are not living with obesity. Intervention group community midwives anecdotally reported to the researcher that they themselves had used some of the booklets, and several commented that they

thought that the booklet should be available for use with all pregnant women, regardless of their weight at the start of their pregnancy.

A strength in the design of the intervention measure (the questionnaire) was that it utilised detailed guidance to developing the theoretical measure, that had been made freely available by the TPB's author (Ajzen, 2012), thereby enhancing the integrity of the development of the measure. Phase Two of this study utilised this detailed guidance in order to develop the first TPB questionnaire in this health research area.

7.6.2. Limitations

It was a limitation that this study was a small study requiring the cooperation of services, without the resources of a large study. This contributed to the increased complexity and associated workload and meant that the research was subject to adapting to personnel and organisational change throughout the duration of the study. The flexible Pragmatic Approach (Dudovskiy, 2018) taken did, however, allow the study to develop the intervention in a changing setting, and that perhaps a more rigid and constrained framework for research, may have found it impossible.

Although the framework provided by Ajzen (2012) facilitated the development of a TPB questionnaire in a new health research area, this factor could also be considered a limitation. Some midwives who participated in the pilot trial in Phase Two reported finding some of the language used in the questionnaire awkward and found question structure odd. This potential limitation was mitigated by the inclusion of the pilot phase which allowed user involvement in the design and development of the TPB scale.

This study was conducted in an area of South West England, where a large majority of the population are white, and only small percentages of other ethnicities were resident in the area. With this in mind, a limitation of Phase Two of this study, was the lack of ethnic and linguistic diversity in the research participants who took part in Phase One of the research, and who therefore contributed to the design and development of the intervention, and this same lack of diversity was seen in the midwives and the research team's dietitian who advised on the contents and the delivery of the booklet. This lack of ethnic and linguistic diversity both within the research team and the study's participants limited the inferences that could be made regarding the application of the intervention in other areas with a greater population diversity. Future research should test the intervention in a multi-centre study, including in areas with ethnically and culturally diverse populations. This further research should review and refine not only the booklet in terms of the language used, but should also research whether it would be considered appropriate or welcome, to discuss body weight in pregnancy in other cultures, and what steps to overcoming implementation issues, as well as feasibility and acceptability could be developed.

7.7 The unique contribution to new knowledge, made by Phase Two

Both the booklet and the scale that were developed during Phase Two, made unique contributions to new knowledge. The intervention booklet was the only booklet to-date whose design was robustly driven by a substantial needs assessment, guided by health psychology theory, and informed by the data of pregnant women living with obesity, and health professionals involved in the care of those women, in order to facilitate midwifery involvement in managing GWG, in pregnant women living with obesity.

The research questionnaire developed in this study was guided by the health psychology framework, the TPB (Ajzen, 1985, 2012) that underpins this study's intervention. This TPB questionnaire, developed to evaluate the intention of midwives to support pregnant women living with obesity, with managing their GWG, was the only TPB questionnaire that had been developed to measure the target behaviour (the intention to support women), in the midwifery population, and as such made a unique contribution to new knowledge.

Phase Three: Testing of the intervention

8.1 Introduction

This chapter describes the recruitment, procedure and results of Phase Three, that tested use of the booklet by community midwives in an intervention. Correlations that examined the relationships between the TPC components and behavioural intention have been presented first. The predictive capability of the questionnaire (appendix 32) which was developed as a part of this thesis and underpinned by the TPB has then been presented, as the analyses of community midwives, in the control and intervention groups, at the pre and post-intervention time points. Correlations that examined the relationships between the TPB components and actual (self-reported) behaviour (henceforth referred to as actual behaviour), of community midwives in the control and intervention groups then follow. Next, this section has presented the t-test analysis of the difference in the behavioural intention scores of community midwives followed by the t-test analysis of the difference in actual behaviour scores of community midwives in the control and intervention groups at the pre and post-intervention time points. The t-test analysis of pre and post-intervention attitude subscale scores of community midwives in the control and intervention groups and the t-test analysis of self-efficacy scores of community midwives in the different groups (intervention or control) then follows.

8.2 Method

8.2.1 Design

This phase (Phase Three) was an exploratory, before and after, trial design. The purpose of this design was to examine whether the use of the booklet by the

midwives would increase their intention to offer support and/or increase the actual support given, to obese pregnant women with controlling their GWG. In order to test the use of the booklet, it was imperative that midwives who were given the booklet to use (the intervention group midwives) were compared to midwives who were not given the booklet to use, and gave treatment as usual (the control group midwives) during the same time period. If comparison with a control group was not conducted then it would have been impossible to test whether any change seen in midwives' intention or actual behaviour, was due to their use of the booklet or to some other unknown factor e.g. a local shop giving out free fruit and vegetables, or a local organisation offering a healthy eating course that the midwives could refer to. This study, therefore, tested both intervention group and control group midwives using the same research instrument which was the questionnaire that had been developed for this purpose during Phase Two. All participants were tested before the inception of the intervention period and after the cessation of the intervention period. This approach was used in order to see if there were significant changes in either intention and or/actual behaviour, that differed in the intervention group, from the control group. If such differences emerged between the control and intervention groups, then it could be inferred that difference may be the result of the midwives' use of the booklet and a rationale for exploring this further in a bigger trial could be suggested.

8.2.2 Recruitment

This study was an exploratory study and as such sample size calculations were not appropriate for this Phase Three study. The strengths of conducting an exploratory study lie in its investigation into the local setting and its adaptation to

that setting and changes that may occur within it, including recruitment strategies.

In the short period of time between the end of the pilot trial of the questionnaire and the planned start of recruitment for the Phase Three, there had been organisational changes occurring within the Maternity Service, as previously detailed in chapter 4. These changes had the potential to affect the recruitment for this phase in a number of ways. There was a reduction to the overall number of practising community midwives as a result of resignations from service and early retirements as a response to what was by some perceived as unwelcomed changes.

The Interim Matron of Community and Postnatal advised the researcher that the new rotation policy, where community midwives rotated into hospital settings every twelve weeks and vice versa would mean that the original plan for the research procedure would not be possible any longer. The new community midwifery teams became dynamic with the onset of the rotation system, and it became probable that potential participants may move into different Community Midwifery or Maternity Unit teams, and different geographical locations (Children's Centres or hospital), at different times. This needed to be considered further and therefore consultation with the community midwives and the Team Leaders who would be involved with the study was conducted.

It had been decided, in a shared decision between the researcher, the community midwives and the Team Leaders, that assigning the intervention time period for five weeks would minimise the potential loss of participants from the intervention which would result from community midwives being transferred out of their community teams and into hospital units if the intervention was to run for longer than that.

Following the organisational changes with the Trust's Maternity Service there remained two Team Leaders who were managing all of the six community midwifery teams in the Trust. Contact was made with these Team Leaders and they requested a meeting with the researcher to discuss the study in-depth. The researcher was successfully able to address key concerns voiced by the stakeholders, and the conclusions of this meeting were:

1. that the intervention would not significantly inconvenience potential participants
2. that the intervention could add value to the practice of community midwives and allow them to address an issue (obesity and excessive GWG in pregnancy) that they did not necessarily feel that they had the time to address ordinarily.

The wholehearted endorsement of the study was then given by the Team Leaders along with the commitment that they would encourage their team members to participate. Following this meeting, both Teams Leaders were key in making sure that team members were aware of the study and why that team was endorsing and encouraging engagement with the study.

In a shared discussion with the Team Leaders, four teams were selected from which to recruit participants. These teams were selected as they were of roughly equal size. Two teams would be allocated for recruitment to the control team and two teams would be allocated for recruitment to the intervention team. The sampling strategy for selecting the midwifery teams was purposive; that is the four teams who were selected would collectively give the greatest opportunity for maximising numbers of participants to the study. The rationale for not selecting the other two teams was that those two teams were significantly smaller than the four that were selected. Furthermore, the researcher was made aware that both

of those two smaller teams had lost their own Team Leaders in the re-organisation and were experiencing challenges in adjusting to the changes. The researcher was made aware that it would be challenging to recruit from those teams and that they may not welcome the additional demands on their time that may be required alongside their significantly reduced staffing levels.

Once the four community midwifery teams had been identified for recruitment, they were randomly allocated to either intervention or control condition via means of pulling the team names out of a hat. The sample size was therefore determined by the maximum number of participants that it was possible to recruit from the participating midwifery teams.

A community midwives' team meeting was attended by the researcher for each of the four teams ($n=40$) who were participating and time was allocated by the Team Leader for a presentation of the study by the researcher, with a question and answer time. Community midwives were recruited in person by the researcher at these team meetings. Where the time allowed, participants completed the pre-intervention questionnaire at the point of recruitment to the study. For participants who had been unable to attend that meeting or had to leave quickly for appointments, the questionnaire was left in an envelope and collected within the week in person, by the researcher.

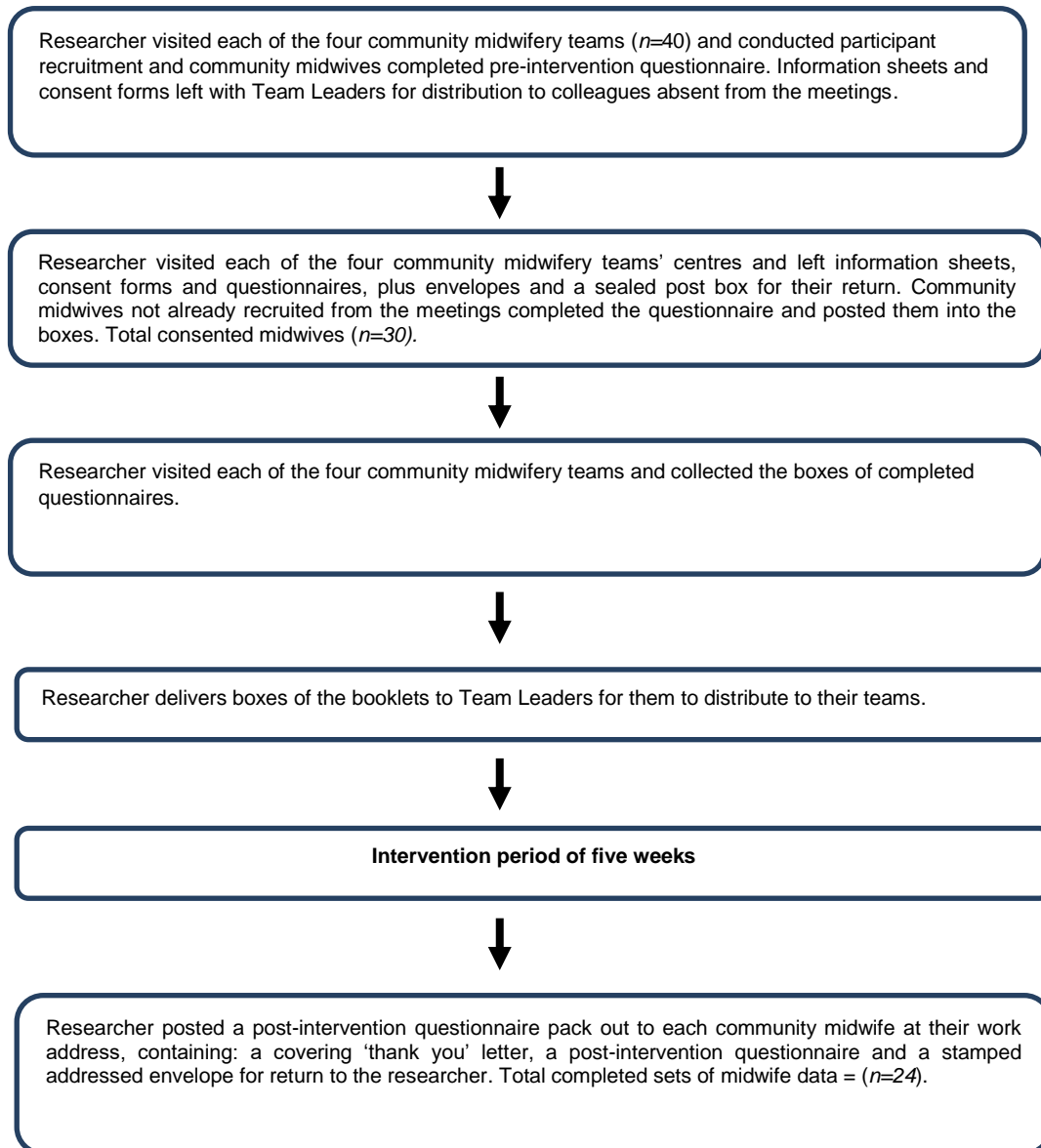
8.2.3 Participants and Procedure

All the community midwives who had consented to take part in this study ($n=30$) completed the pre-intervention questionnaire (appendix 32). Most community midwives completed the pre-intervention questionnaire at the point of recruitment, however for those community midwives who been recruited but were unable to complete the pre-intervention questionnaire immediately, a paper copy of the questionnaire was left, addressed personally to them with an

envelope for them to seal it in once complete and this was collected within a week by the researcher.

After all of the community midwives' participants in a team had completed their pre-intervention questionnaire, the booklets were delivered to the Team Leaders and they distributed the booklets to the intervention participants and their intervention began. After all the community midwives participating in the control teams had completed their pre-intervention measure, their intervention period in which they conducted their 'care as usual' midwifery care, was also started. After five weeks, the clinical placement of each participant was established by contacting the Team Leaders once again. The majority of participants were still practising where they had been for the duration of the intervention but some were in the process of rotating to a new practice setting. For those community midwives who had moved, their new work address was provided by the Team Leaders so that there would be no delay in getting the post-intervention questionnaire to them. Figure 8.1 presents a flowchart of recruitment and data collection.

Figure 8.1: Flowchart of recruitment of community midwives and pre and post-intervention data collection.



As it was important that participants completed before and after questionnaires, each participant was contacted and posted a pack containing the post-intervention questionnaire, already notated with their participation number. Details about how to complete the post-intervention questionnaire, a stamped addressed envelope for return, plus a thank you for the participant was included in the pack. In total for this study, thirty midwives completed the pre-intervention questionnaire and twenty-four of those also completed the post-intervention questionnaire (table 8.1).

Table 8.1: Number of community midwives who completed questionnaires at pre and post-intervention time points

Condition	Pre-intervention	Post-intervention
Control	11	9
Intervention	19	15

Since this study considered whether community midwives were any more intent on supporting pregnant women living with obesity with controlling their GWG when they had a supporting resource at their disposal it was imperative that all community midwives recruited to the study completed the questionnaires both at the pre and post-intervention time points. This was so that a comparison could be made between those community midwives who had used the resource and those who had not. It is for this reason therefore that any data of community midwives who only completed the pre-intervention questionnaire but did not remain in the study and complete the post-intervention questionnaire were not included in the analysis. Of the twenty-four community midwives who completed both pre and post-intervention measures, there were $n=9$ control group and $n=15$ intervention group.

8.3 Analyses of the Theory of Planned Behaviour scale

For the purpose of this analysis, $n=24$ community midwives completed the questionnaire for Attitude, Subjective Norm, PBC and behavioural intention at both time points (pre and post-intervention). There were a small number of missing items from the questionnaire however these items did not form a pattern and therefore the values were replaced using Expectation Maximization (Schafer, 1997; Schafer & Olsen, 1998). Expectation Maximization is a model for estimating the parameters of a statistical, latent variable model; models that are often used in psychology and social sciences and thus used in this thesis. This method of replacing missing values was selected as it addressed the

underestimation of standard errors and therefore biased estimate. Using a simple mean substitution would have been too crude a method of replacing missing values as when several values are missing, substituting with the mean may have too great an effect on the analyses. Missing values were replaced in this thesis as failing to replace missing values may have led resulted in entire cases being excluded from a statistical test or the analyses may have produced results that were biased. As it is not possible to predict when missing data may affect the results, this thesis replaced missing values with a method that estimated what the answers may have been, had they answered, thereby increasing the robustness of the analyses.

All participants in this study were fully qualified midwives who were working as community midwives. The only sociodemographic variable measured, therefore, was “number of years as a qualified midwife” and this varied hugely. Of the twenty-four midwives included in the main analyses, years of practice varied from one year to thirty-four years, with an even distribution of midwives across the thirty-four-year range. This population therefore evenly spanned over three decades and the heterogeneous nature of years of practice indicated that this population would well represent community midwifery over a long time period. The results for the pre and post-intervention time points were analysed separately allowing differences between the control and intervention groups at the pre and post-intervention points to be compared.

8.3.1 Data handling: Statistical testing and significance.

Statistical data were analysed using IBM SPSS Statistics 22 package (IBM Corp, 2013) and the statistical significance threshold that was used was $p \leq .05$. This threshold represents the probability of a Type I error at equal to/or less than 5% and is the standard level, widely used in social sciences research (Cohen, 1992).

Multiple Linear Regression (MLR) was used to analyse the TPB questionnaire that was developed for this study. MLR is used to test whether a continuous dependent variable can be predicted by several independent variables (Field, 2005). MLR is able to describe the 'fit of the model' i.e. how well the package of independent variables collectively predicts the dependent variable, however, MLR also describes the individual contribution of each independent variable to the dependent variable. For this reason, MLR was deemed the most appropriate test for testing the TPB.

In this study, two stages of MLR were conducted. The first stage of MLR tested how well the facets of the TPB i.e. the attitude, subjective norm and perceived behaviour control of community midwives, concerning supporting women living with obesity with managing their GWG; predicted their *intention* to support women with managing their GWG. The second stage of MLR tested how well the facets of the TPB (as described in the paragraph above) **plus** behavioural intention, predicted the *actual* behaviour of community midwives i.e. that they had actually offered support to women living with obesity with managing their GWG. Since this study was exploratory and nothing was known about the independent variables and their relationship with the outcome variables, variables were entered stepwise into the test.

In order to test whether the difference between the behavioural intention and/ or the actual behaviour of midwives before and after the intervention period was *statistically* significant, within-group (also known as repeated-measures), dependent, T-tests were conducted. This test was used for this data as it is considered to be a 'robust' test that is appropriate where there are a continuous dependent variable and a categorical variable with only two related groups (Field, 2005). In this case, the related groups would be the same group before and after

the intervention. The t-tests were conducted separately for the intervention group of midwives and the control group of midwives because this study wished to examine the significance values that represented the difference in the midwives before and after intervention period; were different in the control group and the intervention group.

8.3.2. Presentation of the analyses

The results of the exploratory analyses of the data set are presented first and the relationships between the components of the TPB (attitude, subjective norm and PBC) and behavioural intention at pre and post-intervention time points are presented. Second, the results of the MLR analyses are expounded considering how well attitude, subjective norm and PBC may predict behavioural intention pre-intervention and post-intervention. Third, the results of the Pearson's r that examines the relationships between the components of the TPB (attitude, subjective norm and PBC), behavioural intention and actual behaviour pre-intervention and post-intervention is presented. Behavioural intention is hypothesised to predict actual behaviour (Ajzen, 1985) and therefore the correlations between behavioural intention and actual behaviour in the control and intervention groups, at the pre-intervention and then the post-intervention (of the resource) time points, are described. Finally, the analysis of changes in behavioural intention followed by the analysis of changes in actual behaviour, in the control and intervention groups, at pre-intervention and post-intervention, are reported. Although from the perspective of this thesis there were two main datasets:

1. the data collected at the pre-intervention time point from both control and intervention group

2. the data that were collected at the post-intervention time point from both control and intervention group,

Within each of the sections that are presented hereafter, the analyses are presented in the order of control group then intervention group. This Phase Two of the research sought to examine whether the use of the resource that was developed as a part of this research (Phase One) influenced the behavioural intention and actual behaviour of community midwives to offer support to pregnant women living with obesity with managing their GWG. The results, therefore, are presented within their condition groups (the control group and the intervention group) in order to:

1. elucidate any differences in results that were seen between the control and intervention condition groups
2. highlight any changes that had occurred from pre-intervention to post-intervention, within the condition groups (control and intervention).

8.3.3 Analyses of the predictive capabilities of attitude, subjective norm and Perceived Behavioural Control, in predicting behavioural intention to support controlling gestational weight gain: Exploratory analysis - Pearson's Product Moment Correlation

Pearson's product-moment correlation coefficient (Pearson's r) demonstrated the strength and direction of the linear relationship between the TPB constructs (attitude, subjective norm, PBC) and behavioural intention (table 8.2).

Table 8.2: Correlations between Theory of Planned Behaviour constructs and behavioural intention to support in control and intervention groups at pre and post-intervention time points

	Control group (n=9)		Intervention group (n=12)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Attitude & Behavioural intention	$r = -.280$ $p = .233$	$r = .565$ $p = .056$	$r = .513^*$ $p = .025$	$r = .644^{**}$ $p = .005$
Subjective Norm & Behavioural intention	$r = .010$ $p = .489$	$r = .455$ $p = .109$	$r = .492^*$ $p = .031$	$r = .764^{**}$ $p = .000$
PBC & Behavioural intention	$r = .063$ $p = .436$	$r = -.166$ $p = .334$	$r = .763^{**}$ $p = .001$	$r = .538^*$ $p = .019$

**Significant at the 0.01 level (2-tailed).

*Significant at the 0.05 level (2-tailed).

There are no fixed rules for the values assigned to the strength of the association in Pearson's r , *however*, this thesis used Cohen's (1992) effect size guidelines where $r = 0.1$ is small, $r = 0.3$ is medium and $r = 0.5$ is large.

8.3.3.1 Control group correlations between Theory of Planned Behaviour constructs and behavioural intention

Pre-intervention: At the pre-intervention time point, all correlations between the TPB constructs and behavioural intention were weak and non-significant in the control group, $p > .05$ (table 8.2). There was a small, negative correlation between attitude and behavioural intention and very small positive correlations between subjective norm and behavioural intention; and PBC and behavioural intention.

Post-intervention: As with the pre-intervention correlations the correlations between the TPB constructs and behavioural intention were non-significant, $p > .05$ (table 8.2). There were, however, some differences between the pre and post-intervention correlations. At post-intervention, there was a large positive correlation between attitude and behavioural intention and a moderate positive

correlation between subjective norm and behavioural intention. PBC demonstrated a weak, negative correlation with behavioural intention.

*8.3.3.2 **Intervention group** correlations between Theory of Planned Behaviour constructs and behavioural intention*

Pre-intervention: In this condition, attitude PBC demonstrated a large positive correlation and subjective norm a moderate positive correlation with behavioural intention. All were significant, with attitude and subjective norm significant at the $p < 0.05$ level whilst PBC was significant at the $p < 0.01$ (table 8.2).

Post-intervention: In the intervention group at the post-intervention time point, *all* TPB constructs exhibited large, positive correlations with behavioural intention and *all* correlations were statistically significant. The correlation between behavioural intention and attitude and subjective norm were significant, $p < 0.01$ and the correlation between behavioural intention and PBC significant, $p < .05$ (table 8.2).

Such interesting results suggested that relationships should be further investigated using multiple regression analyses.

8.3.4 Analyses of the predictive capabilities of attitude, subjective norm and PBC, in predicting behavioural intention to support controlling gestational weight gain- Multiple Linear Regression

According to the TPB the more positive an individual's attitude and subjective norm are and the stronger their control belief is towards a behaviour; the stronger their intention to perform that behaviour. This section, therefore, reported the findings of the Multiple Linear Regression (MLR).

MLR was selected for use in the analyses because it could be used to predict the likelihood of behavioural intention to support gestational weight control, based on the collective scores of community midwives on the theoretical constructs that make up the TPB (the model). Furthermore, MLR is able to indicate which theoretical constructs may have an independently influential relationship with behavioural intention to support weight control. Ultimately the analyses sought to examine whether the group to which the participants belonged (control or intervention) predicted whether they intended to offer support to pregnant women living with obesity to control their GWG and whether it could be suggested that the use of the resource influenced that behaviour. If the use of the booklet had influenced the behavioural intention of community midwives, the MLR model representing midwives in the intervention group and measured at the post-intervention time point should be the greatest predictor of behavioural intention and action to offer support to women living with obesity with managing their GWG.

The literature suggested that there was no set rule for sample size in MLR, however, Field (2005), suggested ten samples per predictor variable as a general guideline. As there were three predictor variables (the three components of the TPB) this would suggest that the sample size for this analysis should be $n = 30$. The sample size of twenty-four complete sets of data in this study fell a little below this when analysing 'behavioural intention to support'. Nevertheless, MLRs were conducted to test whether there were sufficiently robust effects of the intervention that would show themselves in analyses. MLR was conducted twice, on the pre-intervention time point data and then on the post-intervention time point data; to test how well the model predicted behavioural intention at each time point.

Before proceeding, assumptions of the MLR were tested to ensure that they were not violated and that MLR was an appropriate test for these data. All pre-intervention and post-intervention data were tested for: independence of residuals; a linear relationship between the predictor variables and the dependent variable; homoscedasticity of residuals; normal distribution of residuals; multicollinearity and that there were no influential points or significant outliers.

Pre-intervention: Assumptions of MLR listed above were tested and there was an independence of residual as assessed by a Durbin-Watson statistic of 2.684. Examination of the partial regression plots (appendix 33) indicated that all relationships between variables were linear and tolerances values for attitude, subjective norm and PBC indicated that there were no multicollinearity issues in the pre-intervention dataset (control and intervention group) which was used for this analysis (tolerance = .644, .508, .527, respectively). Although there were a couple of outliers with a studentized, deleted residual value of ± 3 , their leverage values were not excessive and so the outliers were not removed. Furthermore, there were no Cook's Distances greater than 1 and therefore it was considered that there were no influential points. Finally, the normality of distribution was tested in order for the data to qualify as appropriate to run tests for influential statistics. Examination of the histogram and P-Plots (appendix 33) indicated that data were normally distributed therefore it was considered appropriate to interpret the output of the MLR.

Post-intervention: There was again an independence of residual in the post-intervention dataset as assessed by a Durbin-Watson statistic of 1.869. Examination of the partial regression plots (appendix 33) indicated that all relationships between variables were linear and tolerances values for attitude,

subjective norm and PBC indicated that there were no multicollinearity issues in the post-intervention dataset (control and intervention group) which was used for this analysis (tolerance = .501, .503, .428, respectively). Although there was one outlier with a studentized, deleted residual value of ± 3 , the leverage value was not excessive and so the outlier was not removed. Furthermore, there were no Cook's Distances greater than 1 and therefore it was considered that there were no influential points. Finally, the normality of distribution was tested in order for the data to qualify as appropriate to run tests for influential statistics. Examination of the histogram and P-Plots indicate (appendix 33) that data were normally distributed and therefore it was again considered appropriate to interpret the output of the MLR.

Behavioural intention to support gestational weight control was significantly predicted in the intervention group and not in the control group. Interestingly the intervention group measures significantly predicted behavioural intention to support, both at the pre-intervention and the post-intervention points. The amount of variance (in behavioural intention to support) accounted for by the model was, however, greater at the post-intervention point, where the model explained 48% of the variance compared to the pre-intervention point where the model explained 42% of the variance. Results for each condition (control and intervention group) are presented in detail below.

8.3.4.1 Control Group: *Predicting behavioural intention to support pregnant women living with obesity with controlling their gestational weight gain- Multiple Linear Regression*

The MLR results are presented for the control group pre-intervention followed by post-intervention for comparison purposes (table 8.3).

Table 8.3: Multiple Linear Regression between Theory of Planned Behaviour constructs and behavioural intention of midwives to support pregnant women living with obesity with controlling their gestational weight gain - Control Group

Group	Time Point	Model Sig.	Adjusted R Square	Attitude Sig.	Sub Norm Sig.	PBC Sig.
Control	Pre-intervention	.901	-.439	.498	.881	.836
Control	Post-intervention	.064	.582	.041*	.071	.063

*Significant at the 0.05 level (2-tailed)

Pre-intervention: Table 8.3 illustrates that the TPB was not shown to be a significant predictor of behavioural intention to support pregnant women living with obesity in the control group, $p > .05$.

Post-intervention: MLR showed that whilst the control group did not demonstrate a statistically significant model, $p > .05$, (table 8.3) it did have a statistically significant independent predictor variable in the attitude variable, $p < .05$ (table 8.3). This is indicated in the Standardized Beta Coefficients of attitude, subjective norm and PBC ($\beta = .666$, $p < 0.05$; $\beta = .570$, $p > 0.05$ & $\beta = -.618$, $p > 0.05$) respectively (table 8.3).

8.3.4.2 Intervention Group: *Predicting behavioural intention to support pregnant women living with obesity with controlling their gestational weight gain - Multiple Linear Regression*

The MLR results are again presented for the intervention group pre-intervention followed by post-intervention for comparison purposes (table 8.4).

Table 8.4: Multiple Linear Relationship between Theory of Planned Behaviour constructs and behavioural intention of midwives to support pregnant women living with obesity with controlling their gestational weight gain – Intervention Group

Group	Time Point	Model Sig.	Adjusted R Square	Attitude Sig.	Sub Norm Sig.	PBC Sig.
Intervention	Pre-Intervention	.029*	.420	.932	.845	.035*
Intervention	Post-Intervention	.016*	.482	.622	.052*	.754

*Significant at the 0.05 level (2-tailed).

Pre-intervention: in the intervention group the TPB model was shown to be a statistically significant predictor of behavioural intention to support pregnant women living with obesity with controlling their gestational GWG ($F(3, 11) = 4.376, p < .05$) (table 8.4) with the model explaining 42% of the variance. It should, however, be observed that PBC alone made a statistically significant contribution to the prediction of behavioural intention in this model. This is exemplified in the Standardized Beta Coefficients of attitude, subjective norm and PBC ($\beta = -.031, p > 0.05$; $\beta = -.061, p > 0.05$ & $\beta = .802, p < 0.05$) respectively (table 8.4).

Post-intervention: In the intervention group, the TPB was once again a significant predictor of behavioural intention to support pregnant women living with obesity with controlling their GWG ($F(3, 11) = 5.348, p < .05$) with the model now explaining 48% of the variance; an increase of 6% in the variance from the pre-intervention variance of 42%. It is shown in table 8.4 that at this post-intervention point, subjective norm made the sole, independent, statistically significant contribution to the prediction of behavioural intention in this model. This is represented in the Standardized Beta Coefficients of attitude, subjective norm and PBC ($\beta = .184, p > 0.05$; $\beta = .695, p < 0.05$ & $\beta = -.104, p > 0.05$) respectively (table 8.4).

8.3.5 Analyses of the relationships between attitude, subjective norm, perceived behavioural control, behavioural intention, and actual behaviour: Pearson's Product Moment Correlation Coefficient

Pearson's product-moment correlation coefficient (Pearson's r) demonstrated the strength and direction of the linear relationship between the TPB constructs (attitude, subjective norm, PBC), behavioural intention and actual behaviour (table 8.5).

Table 8.5: Correlations between Theory of Planned Behaviour constructs, behavioural intention to support and actual behaviour at pre and post-intervention time points

	Control group		Intervention group	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Attitude & Actual behaviour	$r = -.121$ $p > 0.05$	$r = .243$ $p > 0.05$	$r = .132$ $p > 0.05$	$r = .579^*$ $p < 0.05$
Subjective Norm & Actual behaviour	$r = -.755^{**}$ $p < 0.01$	$r = -.035$ $p > 0.05$	$r = .196$ $p > 0.05$	$r = .705^{**}$ $p < 0.01$
PBC & Actual behaviour	$r = .141$ $p > 0.05$	$r = -.459$ $p > 0.05$	$r = .015$ $p > 0.05$	$r = .550^*$ $p < 0.05$
Behavioural intention & Actual behaviour	$r = .000$ $p > 0.05$	$r = .514$ $p > 0.05$	$r = -.208$ $p > 0.05$	$r = .588^*$ $p < 0.05$

** Significant at the 0.01 level (2-tailed).

*Significant at the 0.05 level (2-tailed).

8.3.5.1 **Control Group:** Correlations between Theory of Planned Behaviour constructs, behavioural intention and actual behaviour

Pre-intervention: There was no correlation between behavioural intention and actual behaviour shown in the control group at this pre-intervention time point, $p > .05$ (table 8.5). In the control group, correlations between the TPB constructs attitude and PBC, and actual behaviour were small and non-significant, $p > .05$ (table 8.5). Attitude had a small, negative correlation with actual behaviour and PBC showed a small, positively correlated with actual behaviour. There was a large, negative correlation between subjective norm and actual behaviour and this was a strong, significant correlation, $p < .01$ (table 8.5).

Post-intervention: As with the pre-intervention correlations, there was no significant correlation between behavioural intention and actual behaviour. Furthermore, there were no significant correlations between the facets of the TPB and actual behaviour, in the control group after the intervention. (table 8.5).

8.3.5.2 Intervention Group: *Correlations between Theory of Planned Behaviour constructs, behavioural intention and actual behaviour*

Pre-intervention: Attitude, subjective norm and PBC all demonstrated a small, positive correlation with actual behaviour. None of these correlations were statistically significant, $p > .05$ (table 8.5). A small, negative correlation between behavioural intention and actual behaviour was demonstrated in the intervention group at this pre-intervention time point however this was also not statistically significant, $p > .05$ (table 8.5).

Post-intervention: In the intervention group all TPB constructs exhibited large, positive correlations with actual behaviour and *all* correlations were statistically significant at this post-intervention time point. The correlation between actual behaviour and attitude was significant, $p < .05$; subjective norm was significantly correlated to actual behaviour $p < .01$ and the correlation between actual behaviour and PBC was significant $p < .05$ (table 8.5). A strong, statistically significant correlation between behavioural intention and actual behaviour was also demonstrated in the intervention group at this post-intervention time point, $p < .05$ (table 8.5).

To summarise; in the intervention group condition, all four correlations increased markedly from pre-intervention to post-intervention time points from weak and non-significant to strong and significant correlations. For the three TPB constructs, at the pre-intervention time point there was a weak relationship with actual behaviour and a negative correlation between 'behavioural intention' and

'actual behaviour' however in the intervention group condition at the post-intervention time point the relationships between the TPB constructs and actual behaviour were strong and significant and behavioural intention had changed from a negative, pre-intervention relationship with actual behaviour to a post-intervention, strong, positive relationship. There was an absence of any significant improvement in correlational relationships between TPB constructs, behavioural intention and actual behaviour scores of community midwives in the control group from the pre-intervention to the post-intervention time point. It can, therefore, be argued that use of the resource by community midwives in the intervention group increased the actual behaviour of community midwives, to support control of GWG in women living with obesity.

Conducting *Pearson's r* coefficient established that participation of community midwives in the intervention increased the strength of the individual relationships between the TPB components; behavioural intention and action to support women living with obesity manage their GWG. This study then sought to establish whether any change indicated by the correlations with behavioural intention and behaviour of the intervention group could be quantitatively established as a significant change in behavioural intention and actual behaviour. Paired samples t-tests were selected as a robust measure of the difference between the two datasets.

*8.3.6 Examination for the difference in behavioural intention score within control and intervention groups: **T-test***

Difference scores were calculated as the behavioural intention scores post-intervention, minus the behavioural intention scores, pre-intervention. The difference scores for the control group and intervention group were normally

distributed, as assessed by Shapiro-Wilk's tests ($p = .107$ and $p = 0.156$, respectively).

8.3.6.1 Examination for the difference in behavioural intention score within the control group

The post-intervention behavioural intention scores for the control group decreased by a mean of $-.333$ (CI 95%, -2.607 to 1.940). Control group behavioural intention scores were 1.33 (± 2.000) pre-intervention and 1.00 (± 1.658) post-intervention. These changes were not statistically significant ($p > .05$).

8.3.6.2 Examination for the difference in behavioural intention score within the intervention group

The post-intervention behavioural intention scores for the intervention group increased by a mean of $.333$ (CI 95%, $-.415$ to $-.682$) with less variability in scores than pre-intervention scores. Intervention group behavioural intention scores were 2.13 (± 1.060) pre-intervention and 2.27 ($\pm .704$) post-intervention. These changes were also not statistically significant ($p > .05$).

The paired samples t-tests produced no statistically significant change in behavioural intention to support in either pre or post-intervention groups, however; there was an indication of a greater change in behavioural intention in the intervention group than in the control group. Although not statistically significant, there was a mean increase in behavioural intention scores of the intervention group compared to a mean decrease in scores in behavioural intention in the control group. Unfortunately, despite some indication of a positive change in the intervention group, particularly when taken alongside the *Pearson's r* coefficient results; the lack of statistical significance prevents any

further inference being made with regard to condition and change in behavioural intention in this test.

*8.3.7 Examination for the difference in actual behaviour score within control and intervention groups: **T-test***

Difference scores were calculated as the actual behaviour scores post-intervention, minus the actual behaviour scores pre-intervention. The difference scores for the control group and intervention group were normally distributed, as assessed by Shapiro-Wilk's tests ($p = .756$ and $p = .075$, respectively).

*8.3.7.1 Examination for the difference in actual behaviour score within the **control group***

The post-intervention actual behaviour scores for the control group increased by a mean of .333 (CI 95%, -1.428 to 2.095). Control group behavioural intention scores were -1.33 (± 1.414) pre-intervention and 1.00 (± 2.345) post-intervention. These changes were not statistically significant ($p > .05$).

*8.3.7.2 Examination for the difference in actual behaviour score within the **intervention group***

The post-intervention actual behaviour scores for the intervention group demonstrated a statistically significant increase by a mean of 1.586 (CI 95%, .348 to 2.823), ($t(14) 2.748$, $p < 0.05$) with less variability in scores than pre-intervention scores. Intervention group behavioural intention scores were 0.27 (± 1.792) pre-intervention and 1.85 (± 1.139) post-intervention. These changes were statistically significant ($p < .05$).

Paired samples t-test, therefore, indicated a statistically significant increase in the self-reported actual behaviour of community midwives in the intervention

group to support pregnant women living with obesity with controlling their GWG group after their intervention time point using the resource.

Whilst paired samples t-test was unable to report any significant change in the behavioural intention scores between the pre and post-intervention measurement points, there was a significant change in the actual behaviour of the intervention group after participation in the intervention. In fact, both control and intervention conditions saw some increase in scores for actual behaviour however for the control group this was a small and non-significant effect. Actual behaviour scores for the intervention group notably increased and with less variability after participation in the intervention. Pre-intervention scores in the intervention group were 0.27 (± 1.792) and post-intervention 1.85 (± 1.139). Alongside the *Pearson's r* coefficient results that indicated a significantly strong, positive relationship between all of the TPB constructs, the behavioural intention score and actual behaviour score, it is possible to infer with some confidence that participation in the intervention increased action of community midwives to support pregnant women living with obesity with controlling their GWG.

8.4 Analyses of the attitude scale

8.4.1 Examination for the difference in attitude score within control and intervention groups

Difference scores were calculated as the attitude subscale scores post-intervention, minus the attitude sub-scale scores pre-intervention. The difference scores for the control group and intervention group were normally distributed, as assessed by Shapiro-Wilk's tests ($p = .908$ and $p = .893$, respectively).

*8.4.1.1 Examination for the difference in attitude score within the **control group***

The post-intervention attitude subscale scores for the control group increased by a mean of 1.089 (CI 95%, -4.469 to 6.646). Control group attitude subscale scores were 7.000 (\pm 4.528) pre-intervention and 8.089 (\pm 4.215) post-intervention. These changes were not statistically significant ($p > .05$).

*8.4.1.2 Examination for the difference in attitude score within the **intervention group***

The post-intervention attitude subscale scores for the intervention group decreased by a mean of 1.733 (CI 95%, -4.549. to 1.083). Intervention group attitude subscale scores were 8.713 (\pm 4.185) pre-intervention and 6.980 (\pm 4.647) post-intervention. These changes were also not statistically significant ($p > .05$).

There was no significant difference in either condition between the attitude score of community midwives from pre to post-intervention. Without statistically significant results nothing can be inferred from these findings.

8.5 Analyses of the GSE-6 self-efficacy scale

8.5.1 Examination for difference within control and intervention groups in self-efficacy

Difference scores were calculated as the self-efficacy scores post-intervention, minus the self-efficacy scores pre-intervention. The GSE-6 was scored with participants asked to rate the extent to which each item applied to them on a scale ranging from “not at all true” (1) to “exactly true” (4) and item scores were summed for all six items. The difference scores for the control group was normally distributed, as assessed by Shapiro-Wilk's test ($p = .557$) however difference scores for the intervention group was not normally distributed as assessed by a Shapiro-Wilk's test ($p = .026$). As the data did not entirely meet the assumptions required for paired samples t-test, data were transformed however

exploratory tests noted that the transformed data performed worse than it had done previously. Wilcoxon's signed rank test was also conducted but the histogram lacked symmetry with this data and therefore Wilcoxon's was deemed inappropriate for this data. The decision was taken therefore to proceed with the paired-samples t-test as paired samples t-test is reasonably robust to violation of normality and type I errors are not significantly affected by non-normality. Finally, when exploratory data were conducted without splitting the file (control and intervention) the data met the assumptions of the test.

*8.5.1.1 Examination for difference within **control group** in self-efficacy*

The post-intervention self-efficacy scores for the control group decreased by a mean of .778, with a standard deviation of 1.4, (CI 95%, -1.850 to .294). Control group self-efficacy scores were 17.778 (\pm 2.438) pre-intervention and 17.000 (\pm 2.062) post-intervention. These changes were not statistically significant ($p > .05$).

*8.5.1.2 Examination for difference within **intervention group** in self-efficacy*

The post-intervention self-efficacy scores for the intervention group increased by a mean of .759, with a standard deviation of 1.5, (CI 95%, -.095 to 1.613). Intervention group self-efficacy scores were 17.530 (\pm 2.617) pre-intervention and 18.289 (\pm 3.383) post-intervention. These changes were also not statistically significant ($p > .05$).

It is likely that the results seen here for self-efficacy results were found because the community midwives that participated in this study were self-assured and confident professionals. During phase one they expressed doubts about their current capacity to offer support to pregnant women living with obesity with their weight; however, the doubt expressed was not self-doubt, more doubt concerning their knowledge and doubt concerning the capability of the maternity

service to support women living with obesity with weight management. All community midwives that were involved with the study, without exception expressed the view that given the right resources they could positively support pregnant women living with obesity with managing their GWG. Out of a possible maximum self-efficacy score of 24 (6 items scored from 1 to 4), the mean scores were consistently high and almost identical at all points. In short, for this group of participants, their self-efficacy was very high before the intervention and remained very high.

Discussion

9.1 Introduction

This chapter has discussed the findings from this study in light of the research literature, and in doing so has explicitly answered the research questions within each phase. In order to follow the chronological development of the study, this chapter has presented first the development and implementation of the intervention, which concerned Phases One and Two of the study. In this section (9.2), the top-level findings from these phases were extracted in order to answer the research questions and findings have been discussed in the context of research literature.

In section 9.3, the findings of Phase Three, which tested the use of the booklet, have been discussed. Following the chronological order of the study, this section has been presented as pre-intervention findings and post-intervention findings, and the research questions concerning Phase Three have been addressed and critically examined with consideration of the research literature. The strengths, limitations and unique contribution to new knowledge made by this phase, then follow in sections 9.4 and 9.5. In section 9.6 the strengths of the whole study have been presented, followed by the limitations of the study in 9.7. Recommendations for future research have then been made in section 9.8. Finally, this chapter has presented the conclusion of this thesis, including the unique contribution to new knowledge that has been made by this study.

9.2 Phases One and Two: The development and implementation of the intervention

The intervention development was conducted from a Pragmatic Approach (Dudovskiy, 2018) in order to access rich data, using both deductive and inductive research methods, that could inform the design and implementation of an intervention. This intervention sought to support the control of gestational weight gain in women living with obesity, in a manner that was relevant to community midwives and pregnant women living with obesity. Phase One was a large information gathering and theory building exercise that consulted with pregnant women living with obesity, hospital and community midwives, dietitians and complex case obstetricians. They were asked for their opinions and experiences related to body weight and controlling gestational weight gain, with particular reference to overweight and obesity in pregnancy. Data were qualitatively and exhaustively analysed using Thematic Analysis (Braun et al, 2006) in order for pertinent themes to emerge from the discourse of pregnant women living with obesity and health professionals involved in their care. This relatively lengthy and expansive phase of the study was considered to be imperative to the design of the intervention.

The Pragmatic Approach (Dudovskiy, 2018) taken by this study was both inductive and deductive, and the Phase One qualitative phase informed the data-driven design, grounded in the data of the health professionals caring for pregnant women living with obesity themselves. In this thesis, it has been demonstrated that the adaptation to a local setting that was possible within the flexibility of a Pragmatic Approach (Dudovskiy, 2018), was essential to the successful delivery of the intervention, at a time when the Maternity Service was undergoing re-organisation.

This study also conducted a pilot study, both testing the questionnaire that had been developed for Phase Three, and for testing the feasibility of administering the questionnaire to community midwives, giving insight into optimal methods of communication between researcher and midwives and the length of the questionnaire. The pilot study for this research was primarily guided by Ajzen's (2012) recommendation to conduct a pilot study on the TPB questionnaire that had been developed for the study, in order to reduce the number of items in the questionnaire to optimise the effectiveness of the questionnaire as detailed in chapter 7. As the pilot study sample ($n=10$) represented 25% of the total number of participants that it would be possible to recruit for in Phase Three of the study, in this instance, the results of the pilot study for this research provided good evidence for the changes that were made.

The literature reviewed in this thesis had identified that there was no published research that had tested a behaviour change intervention for midwives, that sought to facilitate their involvement in supporting gestational weight management in women living with obesity. Published interventions concerning the management of gestational weight gain in women living with obesity, were interventions that were conducted with pregnant women, and not midwives. The consultation and developmental phases of this study were, as previously discussed, essential in designing an intervention that was appropriate, feasible and therefore effectual. The Standard Evaluation Framework for Weight Management Interventions (Public Health England, 2018) recommended that evaluation of local interventions that could be delivered as a part of routine care should be conducted. The framework stated that data concerning the successful components of weight management interventions were often inconsistent. Basing the design of the intervention on a rigorous stakeholder consultation,

helped this study to identify the components of an intervention that would increase its likelihood of success, by targeting the salient beliefs of those users.

In the World Health Organization's Knowledge Network on Health Systems (WHO Commission on the Social Determinants of Health 2008), it was suggested that health systems should specifically address the needs of those who were marginalised and socially disadvantaged in a drive towards equity in healthcare provision. These were individuals from low-income groups and women. The stakeholder consultation that informed the needs assessment conducted for this study, included pregnant women living with obesity, resident in the geographical area in which the intervention would be delivered, *plus* health professionals involved in the daily care of these women. This consultation, therefore, followed the recommendations made by the WHO (2008) and answered the Phase One research questions. In order to exemplify how the needs assessment, i.e. the stakeholder consultation, answered Phase One research questions, the findings that underpinned key aspects of the intervention design, are subsequently presented with the research questions from this phase.

What were the views and experiences of pregnant women living with obesity and maternity health professionals concerning obesity in pregnancy and managing gestational weight gain?

As was discussed earlier in this thesis, the geographical area in which the community midwives in this study practised, has a lower than national average income, and lower than the national average level of educational attainment. In consultation, a number of the pregnant women living with obesity spoke about the important concern of having to make an extra journey to a 'class' or 'course', both the cost and inconvenience to them, without a car and this was an

important consideration in looking at the design of any support for them with managing their gestational weight gain. Vanstone et al (2017) conducted a systematic review and meta-synthesis of pregnant women's views of gestational weight that evaluated the views of over one thousand women. In this review and meta-analysis, pregnant women reported low income and the unaffordability of exercise classes and resources as a barrier to their optimal gestational weight gain. The Lifestyle Course (TLC) found that women were only able to attend their evening sessions if parking and a crèche were provided by the study (Smith et al, 2015). By running their intervention in the form of additional classes, outside of the woman's normal day where they may have had their children in school, the TLC created barriers to the women taking part and in order to address those barriers, there was a significant cost to the study.

Poston et al (2015) reported women's reluctance to take part in their complex behavioural intervention, the UPBEAT study. The behavioural intervention for women required attending an initial goal-setting interview, followed by eight weekly, hour-long sessions with a Health Trainer. Women also received advice on self-monitoring, problem-solving and social support. Furthermore, the women in the study received a handbook in which included information about the intervention and the theory behind it, recommended foods and recipes, and suggestions for physical activity. Women also were given an exercise DVD for pregnancy, a pedometer, and a log book for recording their weekly SMART goals. The UPBEAT study was conducted in an area of socio-economic deprivation and just 19% of eligible women gave their informed consent to take part in the study. Many of the women in the NHS Trust that participated in the study that has been presented in this thesis lived in areas of socio-economic deprivation, therefore extra classes could have been problematic for them to attend and it was likely that low recruitment could be also expected for such a

complex intervention in this study. Bearing this in mind, the views and experiences of women that were consulted for this thesis were taken into account in designing something that fitted into their normal day and alongside pre-existent appointments to minimise inconvenience and cost to them. Furthermore, pregnant women living with obesity reported that they had a bond of trust with their midwife and would trust the advice that they received from them.

Women who were interviewed reported that the great amount of information in the public domain that they had access to often created confusion rather than knowledge as many sources gave differing advice from each other. Wilcox et al (2015) found that a high proportion of women cited media as their primary source of information concerning weight gain in pregnancy and suggested that this source of information lacked an evidence base. Wilcox et al (2015) also suggested that pregnant women living with obesity were more likely than normal-weight women to seek information about managing their weight gain. In a feasibility and acceptability study of midwife-led intervention for women who sought to achieve a healthy lifestyle during their pregnancy, women reported being happy to discuss their lifestyle choices with their midwife (Warren et al, 2017). As was found by Warren et al (2017), interviews with pregnant women living with obesity in phase one found that women would prefer to receive weight management advice by a trusted source (i.e. their midwife) and that this would be well received by pregnant women living with obesity.

When consulted, midwives stated concerns about damaging the bond of trust that they felt that they had with pregnant women, if they handled the discussion about weight badly. This finding supported the literature reviewed, that suggested midwives may avoid communicating about risks associated with a

raised BMI for fear of upsetting or offending women (Christenson et al, 2018; Holton et al, 2017). Midwives talked about the sense that they were solely responsible for making the decision about what, how and when to broach the subject of gestational weight management when talking to women living with obesity. This study utilised these views and experiences of midwives in the overall design of the intervention to create a booklet for midwives to give to pregnant women living with obesity. This booklet would provide informational support, specifically concerning their gestational weight management and (unless deemed inappropriate at the time) would be given to all pregnant women living with obesity at the same point in their pregnancy by all midwives in the intervention group.

What would pregnant women living with obesity and maternity health professionals like to happen concerning the management of gestational weight gain in pregnant women living with obesity?

Midwives clearly stated in Phase One that they would like to deliver support for controlling gestational weight gain if they had something to offer. Pregnant women living with obesity expressed that they would prefer to receive advice and guidance regarding gestational weight control during their pregnancy, from their midwife and developed in collaboration with them.

A majority of obese pregnant women expressed that what they would really like was clear, basic, friendly information about what was healthy for them and would help them to manage their weight during pregnancy. A number of the women stated that simple recipes which did not take long to prepare or at a low cost would be really helpful. The pregnant women living with obesity that were consulted in Phase One, almost unanimously suggested that they simply wanted to know what they could affordably eat during the pregnancy that was best for

them and their babies' health. Most women reported having had no conversation with their community midwives or any other healthcare professional about food other than in the context of the list of foods to avoid for example soft cheeses. This finding reflected the findings of Atkinson et al, (2017) who reported that women received insufficient information from health professionals about raised BMI and weight management. This research, therefore, provided the practical advice and tasks related to achieving optimal diet in pregnancy for women living with obesity, that midwives had reported that they wanted to be able to offer and that the pregnant women themselves had said that they wanted to receive. This information was achievable for women on a low income, with a lack of cooking confidence and little time, and was in a format that would be useful for them at all times; a take home and keep booklet.

The community midwives who were consulted in this study, supported the production of a booklet with which they could offer support for weight management. Community midwives felt this would be empowering. They also reported being aware that they were required by NICE (PH27, 2010) to offer weight control support to women that they had identified as being obese at the start of their pregnancy but were without tools to action this. In a large qualitative study conducted across 13 Maternity Units, a review of the effectiveness of information leaflets in facilitating women's making of informed choice in their maternity care was conducted (Kirkham and Stapleton (eds), 2001). This review found that an exceptionally high percentage of women (between 92-99%) reported the leaflets to be either helpful or very helpful, suggesting that the booklet information provided in this study could be well received by women. Midwives interviewed by Holton et al (2017) also suggested that routine maternity care should be supported with printed information in order to assist women with managing their weight. Midwives wholeheartedly welcomed the

suggestion that their involvement in this research project would allow them to contribute to the design, development and delivery of a booklet that would increase their capacity to offer such support, and this, in turn, informed the design of an intervention which would be acceptable and feasible for midwives to deliver.

What did pregnant women living with obesity and maternity health professionals think would work concerning the management of gestational weight gain in pregnant women living with obesity?

Despite the finding that the leaflets were considered helpful by a majority of pregnant women in their study, those women did not report making a greater amount of informed choices (Kirkham and Stapleton (eds) 2001). In their evaluation of the study, the authors drew attention to a 'lack of strategy for distributing the leaflets' and the 'invisibility' of the leaflets in some of the maternity settings, as challenges to the leaflets' effectiveness on influencing behavioural change in the women. In this study, the intervention was not targeted at the pregnant women but at the community midwives. The intervention reported in this thesis was community midwives giving out the booklets to pregnant women living with obesity, which would inherently require them broaching a conversation around gestational weight gain with those women, in order to preface giving them the booklet. Pregnant women living with obesity reported inadequate information from health professionals regarding their BMI and managing their weight and suggested that midwives avoided challenging discussions about these issues (Atkinson et al, 2017). Kirkham and Stapleton (eds), 2001) found that women in the maternity settings that they studied actually wished for a greater amount of information than that they were being given, however, the midwives in the settings that they reviewed were

considered to have missed opportunities as a product of time pressure and fear of litigation. The findings of Kirkham and Stapleton (eds) (2001) supported the rationale for the approach taken by this study.

The midwives that were consulted during Phase One of this study stated that in order for them to be confident in offering support to women living with obesity, there needed to be a standardised approach to broaching the discussion of gestational weight gain. All midwives that were consulted, stated that at the time of asking there no universal approach within the Trust's Maternity Service for either broaching the discussion or any consistently available support that they could offer to women living with obesity who wished to manage their gestational weight gain. All midwives stated that *if* there were a tangible resource that they could offer women, *plus* an agreed approach that was endorsed by their Trust's Maternity Service, then this would enable them to offer this support to women living with obesity.

The Maternity Service endorsement of this study and active endorsement demonstrated by the Community Midwifery Team Leaders, during the development of the intervention ensured that the booklets produced for the intervention were not 'invisible' and that community midwives in the intervention were unlikely to 'miss opportunities' to offer support with managing gestational weight gain. The Community Midwifery Team Leaders and the Champions had decided on a standardised approach time to introduce the booklet to pregnant women living with obesity (notwithstanding the ability to make independent decisions not to proceed if the midwife decided that it was inappropriate) therefore removing the individual midwives' need to look out for 'opportunities' to talk about managing gestational weight gain with women living with obesity, and bringing in the introduction of the booklet and management of gestational weight

gain into the normal practice timeframes. By utilising this approach, this study was also able to address the other challenge documented by Kirkham and Stapleton (eds) (2001), which was the concern of midwives that they would not have the time to give additional information to women in their care within the normal framework of maternity care.

Utilising A Pragmatic Approach (Dudovskiy, 2018) as the research philosophy that underpinned this study, this needs assessment, stakeholder consultation phase was able to answer the Phase One research questions that informed all aspects of the design and delivery framework for the intervention. Utilising the views, experiences and ideas of stakeholders to answer the Phase One research questions increased the likelihood of the intervention being feasible and acceptable for community midwives; and facilitated midwifery involvement in supporting women living with obesity, to manage their gestational weight gain.

9.3 Phase Three: Testing community midwives use of the intervention

This forthcoming section is presented as a discussion of pre-intervention findings and post-intervention findings. The Phase Three research questions are answered in these sections, and the findings examined in consideration of the research literature.

9.3.1 Phase Three: Pre-intervention

It was notable in the pre-intervention data of the control group that all relationships between the components of the TPB and the community midwives' behavioural intention to offer support to pregnant women living with obesity with controlling their gestational weight gain, were not significant. Subjective norm and perceived behavioural control were weakly correlated related to behavioural intention and there was a small *negative* correlation between attitude and

behavioural intention of the community midwives in the control group. Multivariate analysis showed that there was no predictive capability of neither the TPB model nor any individual capability of components to predict the behavioural intention of community midwives in the control group to support women living with obesity with controlling their gestational weight gain.

By comparison, it could be suggested from an examination of the pre-intervention data of the intervention group community midwives, that participation in the study had influenced the beliefs that community midwives held about supporting gestational weight gain in women living with obesity, even at the pre-intervention time point. The pre-intervention Multiple Linear Regression analysis showed that the TPB model was a significant predictor of behavioural intention of community midwives in the intervention group with perceived behavioural control independently predicting behavioural intention. Pre-intervention Pearson's *r* analysis of the relationship between components of the TPB and behavioural intention revealed a significant, large correlation between perceived behavioural control and behavioural intention. Even at the pre-intervention time point, there were notable differences between the behavioural intention of midwives in the control group and midwives in the intervention group.

Pre-intervention findings from the control group data supported the views of the community midwives that were reported during the qualitative Phase One of the study, regarding their involvement with broaching the discussion of weight with women living with obesity. The small and negative relationship between attitude and behavioural intention reported, evidenced the control group, community midwives' beliefs about the likely outcomes of their seeking to discuss and/or support women living with obesity with controlling their gestational weight gain.

During Phase One a high proportion of community midwives expressed concern that they would potentially offend women living with obesity if they discussed their body weight and risked causing those women to disengage with the Maternity Service if they caused offence. During this consultation phase, many of the community midwives stated that they were not unwilling to support controlling gestational weight gain with women living with obesity, but felt that they did not know how to approach the subject. Furthermore, these community midwives stated that not only were they unsure of how to communicate effectively about this issue but that should they choose to broach the subject of limiting weight gain; they were unsure if they could offer advice and support that that was clinically accurate and correct.

Arrish et al (2016) reported insufficient knowledge about nutrition in pregnancy, including pregnancy weight gain, on a large scale, web-based, survey of the nutrition knowledge, attitudes and confidence of midwives. Olander et al (2011) noted that the maternity care professionals, who took part in their focus groups concerning gestational weight gain, reported a “lack of knowledge regarding gestational weight gain” (Olander et al, 2011, p.47). These same concerns were identified in the literature that examined the perspectives of midwives regarding their training requirements in maternal obesity (Heslehurst et al, 2013). Supporting these published findings, this thesis posits that the *negative* relationship between the attitude and behavioural intention of community midwives in the control group presented the greatest influence on their behavioural intention to offer support to pregnant women living with obesity. This thesis suggests that community midwives’ believed that they may do harm to their relationship with the woman and disenfranchise them from Maternity Service if they broached a discussion about body weight with women living with obesity if they were not adequately trained and equipped to do so.

There was a small positive relationship between the other components of the TPB (subjective norm, perceived behavioural control), and behavioural intention. This finding means that for the control group of community midwives, the beliefs of community midwives' significant others (such as their colleagues), and their beliefs about how much control they possessed with regards to offering support to pregnant women living with obesity; had little influence on the community midwives behavioural intention to support women living with obesity with managing their gestational weight gain. The qualitative, consultation data from Phase One emphasised that midwives felt that there was no established process in Maternity Services that trained and educated them about how to initiate a discussion and then offer support to women living with obesity with managing their gestational weight gain. During Phase One, the qualitative, consultation phase of the study, many of the emergent themes from the midwives' data concerned the lack of an established care pathway with the Maternity Service for midwives to offer support. The emergent themes highlighted both a lack of national directive and also a lack of practical booklets that would enable them to give pregnant women living with obesity the care that community midwives feel the women require. Findings from Phase One were subsequently supported by the data of the control group midwives, with the absence of any significant relationships between the components of subjective norm and perceived behavioural control, and the control group midwives' behavioural intention to offer support to women living with obesity with managing their gestational weight gain.

Hunter et al (2008) suggested that community midwives' knowledge was enhanced through reflection on practice with their colleagues and served to optimise learning. It was suggested therefore that the control group midwives' perception was that across the maternity service, there was no standardised

approach to supporting the control of gestational weight gain in pregnant women living with obesity. This situation may have discouraged discussion on the subject with colleagues and the community midwives' knowledge was not enhanced. Olander et al (2011) explored the views of pregnant women and health professionals including midwives ($n=7$) regarding gestational weight gain. In this study, health professionals reported being unsure of what to advise women concerning their gestational weight gain. Whilst Olander et al (2011) did not focus specifically on maternal obesity and its relationship with gestational weight gain, the study reported that health professionals felt that the care that they delivered was limited by their lack of knowledge. Furthermore, some of the information that the health professionals had shared with women was incorrect. Arrish et al (2016) also reported that although midwives' attitudes towards nutrition in pregnancy were positive, their nutrition knowledge was inadequate in some key areas, including weight gain. Olander et al (2011) suggested that it was important therefore that health professionals felt confident in their knowledge of what they should deliver to pregnant women concerning gestational weight gain. Heslehurst et al (2013) also reported that in their consultation with the community and hospital midwives ($n=46$), midwives did not provide weight gain feedback to women living with obesity, even when the women asked them for it, because they lacked confidence in their knowledge of correct Maternity Service guidance. It was likely that these experiences reported by Olander et al (2011) and Heslehurst (2013) were replicated in the Phase One data of maternity health professionals in this study.

In an exploration of women and healthcare practitioners' views of weight in pregnancy, Furness et al (2015) reported that the maternity healthcare practitioners that they spoke to, would like to see an increase in the social awareness and prioritisation of weight as a health concern during pregnancy. It

is likely in the Furness et al (2015) study, that the expressed wish for awareness raising and prioritising of weight as a health concern in pregnancy, was a wish for clarity regarding the beliefs of the healthcare practitioners' normative referents i.e. the Trust, the NHS, and colleagues. The findings of this study suggested that control group community midwives were also not necessarily aware of the beliefs of their normative referents with regards to supporting gestational weight gain in pregnant women living with obesity, at this pre-intervention time point and therefore it did not influence their behavioural intention to offer support.

In the Phase One, qualitative data, community midwives expressed frustration that even if they had chosen to offer support to pregnant women living with obesity to manage their gestational weight gain, that there were no booklets that could be used in the care and support of this group. Chapter 4 described the many themes in which this issue was exemplified and the hospital and community midwives' discussed the loss of the 'Pregnancy Book'; a book of information that they had previously found invaluable. The lack of a correlational relationship between perceived behavioural control and control group midwives' behavioural intention supported their perception of having little control over whether they are able to offer support to women living with obesity with controlling their gestational weight gain. Ajzen (1985) stated that it is an assumption of the TPB that people will perform a behaviour if given volitional control over the behaviour. Community midwives during Phase One, reported their *lack* of control over their capacity to offer tangible support to pregnant women living with obesity, e.g. attempting to make referrals to dietetic support, to be told that their referral couldn't be fulfilled, and losing what they had considered an invaluable tool in their practice the 'Pregnancy Book'. As community midwives had experienced an *actual* lack of control regarding their

capacity to offer support. These experiences were represented by the small correlation between perceived behavioural control and behavioural intention, since the control group community midwives were only informed by their own experiences, in relation to the amount of control that they had to offer tangible support.

It can be suggested that participation in the intervention group of this study influenced the behavioural beliefs of community midwives, and resulted in them reporting more positive beliefs concerning managing gestational weight gain in women living with obesity before the intervention period *because* they knew that they were about to receive a booklet that was designed to facilitate their engagement with weight management. It was likely here that the beliefs of the intervention group community midwives were more positive than those in the control group at the pre-intervention time point because of the control that they perceived they had over their capacity to offer tangible support to women living with obesity, with managing their gestational weight gain.

In the themes that emerged from Phase One, it was expressed by a number of community midwives that there was nothing in terms of tangible, practical booklets that they were able to offer pregnant women living with obesity, for managing their gestational weight gain. Community midwives who participated in the intervention group were aware in advance of the intervention period that they would have the booklet to utilise for five weeks, to support women living with obesity with managing their gestational weight gain. All community midwives participating in the study were made aware that the booklet was informed by the views and experiences of maternity health professionals (predominantly community midwives) and pregnant women living with obesity. Therefore, during the intervention development, it was concluded that the

booklet should address points that the community midwives thought were relevant and important for them and pregnant women living with obesity.

Intervention group community midwives were informed that following collection of the pre-intervention data, the booklet would be delivered to their Children's Centre bases for immediate use in clinical practice. Community midwives in the intervention group, therefore, perceived that they possessed a large degree of control over their capacity to offer support to pregnant women living with obesity with controlling their gestational weight gain at the pre-intervention time point. It can be suggested that perceived behavioural control was the only independent predictor of behavioural intention because the community midwives in this group knew that they were going to receive a booklet, which they would then forthwith be able to offer to women living with obesity. The perception of community midwives about the degree of control that they would have over being able to offer tangible support to pregnant women living with obesity, with controlling their gestational weight gain, was, therefore, the most influential at the pre-intervention time point.

In the pre-intervention, control group data it had not been expected that there would be a significant relationship between behavioural intention and actual behaviour. There had been no evidence in the statistical analysis for the contribution of the TPB components, to the control group midwives' behavioural intention, therefore it was not, therefore, anticipated that there would be any significant relationships between the TPB components and *actual* behaviour in this group. All of the TPB components performed similarly in relation to *actual* behaviour as they had to behavioural *intention*, however, the relationship between subjective norm and actual behaviour was statistically significant and notably different to the relationship between subjective norm and behavioural

intention. The relationship between subjective norm and behavioural intention was a small, positive correlation; by comparison, the relationship between subjective norm and actual behaviour was a large, negative correlation. It was important to try to understand why this component of the TPB would relate so differently to actual behaviour than it did to behavioural intention, since according to Ajzen (1985), the components of the TPB contribute to the development of behavioural intention and subsequently, actual behaviour.

The small relationship between subjective norm and behavioural intention has already been reported as a product of the lack of an established Maternity Service process (as perceived by midwives during the Phase One consultation), that community midwives could follow in order to offer support with controlling gestational weight gain, to women living with obesity. From the results of this study, it was likely therefore that the participation of the community midwives in the control group of this study had generated a unified perspective across this specific group. Participation in the study albeit in the control group condition may have resulted in the community midwives in this group forming a control group identity i.e. that their role in the study was as community midwives who were **not** offering a booklet to pregnant women living with obesity This group 'identified' as the group who were **not** offering additional support and this was reflected in the large, negative, statistically significant correlation between subjective norm and actual behaviour in the control group. Although the role of the control group was to provide the baseline of 'normal' standard care midwifery and enable comparison with the intervention group; it was likely that involvement in the study nevertheless had an effect on the control group.

McCambridge et al (2011) suggested that answering self-report questions as a part of a behaviour change intervention may expose control group members to

important aspects of the intervention which may affect the answers that they give. In a systematic review of research assessments, McCambridge et al (2011) suggested that the assessments themselves may alter receptivity to the intervention in those in the intervention groups and furthermore affect the behaviour of control groups, however they reviewed too few high-quality trials to infer that this was the case.

Psychological research has found that performance of a behaviour may be impaired when a person belongs to a group in which there is a negative perception of their group's identity (Shih et al, 2006). In research that examined sociocultural stereotypes, Shih et al (2006) reported that performance was impaired when people belong to a group that was associated with negative stereotypes in a specific domain. For instance, '*women have poorer quantitative skills than men*' resulted in poorer quantitative performance when their gender identity was brought the fore (by means of completing a questionnaire that asked them their gender and asked questions where their gender identity was made salient). This research supported the suggestion made by this thesis that the midwives who participated in the control group of this study may have developed a control group 'identity' i.e. that they were less able to offer support with weight management to women living with obesity, than intervention group midwives. It is suggested, therefore, that when their control group identity was made salient to them at the point where they completed the questionnaire, this resulted in the community midwives in the control group self-reporting lower levels of actual support, than intervention group midwives.

In the intervention group midwives, all three components of the TPB showed only small positive correlations with actual behaviour at the pre-intervention time point. Furthermore, there was a small negative correlation between behavioural

intention and actual behaviour. These findings were unsurprising as during the qualitative Phase One of this study (chapter 4), it had been established that many community midwives alongside other maternity health professionals had decided previous to their participation in the study, *not* to offer support to pregnant women living with obesity with supporting their gestational weight gain. This meant that when they completed the questions about having offered support to women living with obesity with managing their weight gain, they had not, prior to their involvement in the study, done so.

The reasons given by community midwives and health professionals for not having previously offered/delivered support for managing gestational weight gain to women living with obesity, both in this study and by supporting literature were a lack of knowledge and booklets (Holton, 2017; Heslehurst et al 2013; Olander 2011). As previously discussed Heslehurst et al (2013) reported midwives' perspective on their requirements that would enable them to optimise the care that they give in maternal obesity. Many of the themes that emerged from Heslehurst et al (2013), also emerged from the Phase One data in this study. Midwives in this study wished for the provision of knowledge and skills in order to address uncertainty about how to convey weight-related information to women living with obesity and to increase their confidence about correct and appropriate guidance regarding gestational weight gain in women living with obesity. It was this lack of confidence in whether the information that they were sharing with women, was appropriate or correct that Olander et al (2011) had reported, prevented midwives from having weight-related discussions with pregnant women.

Heslehurst et al (2103) reported similar findings as the findings of this study in their thematic analysis, of the data of midwives working in an NHS Trust in

England. The findings of Heslehurst et al (2103) were similar to those of this study and therefore, as suggested by Olander et al (2011), prior to involvement in the intervention, the midwives in this study may have hesitated to offer advice or support to pregnant women living with obesity concerning their weight gain because they lacked confidence in their knowledge. In this study it was likely that because the community midwives in the intervention group knew that they would be receiving a booklet in the near future, this had the potential to positively influence behavioural intention. There was, however, no reason to suppose that the knowledge that receiving the booklet *in the future* would already have influenced actual behaviour since the report of actual behaviour was inherently a report of past behaviour.

In order to answer the Phase Three research questions, pre-intervention findings must be compared with the post-intervention findings, and any changes that occurred within each group (control and intervention) evaluated. The next section will discuss the findings from the post-intervention tests.

9.3.2 Phase Three: Post-intervention

Neither the Multiple Logistic Regression model for the post-intervention control group nor the correlations between TPB and behavioural intention were statistically significant. Nevertheless, examining correlational relationships between the components of the TPB and control group behavioural intention, highlighted that some change had occurred. There were changes in the size of the correlational relationships between variables from pre-intervention to post-intervention. The involvement of community midwives in the control group had effected change in all of the components of the TPB even though their role in the control condition meant that they were not able to offer a booklet to support pregnant women living with obesity with controlling their gestational weight gain.

The results of the Multiple Linear Regression for the control group showed that the TPB was **not** a significant predictor of behavioural intention. The component of '*attitude*' however, individually predicted behavioural intention and the post-intervention correlations for the control group highlighted this. There had been a correlational shift from a small, negative pre-intervention relationship between attitude and behavioural intention; to a large, positive, post-intervention relationship between attitude and behavioural intention.

Consideration of the in-depth, qualitative data gathered during Phase One of this study has supported the findings of literature which reported that midwives perceived that the outcomes of offering support for gestational weight management and offering advice to women living with obesity about managing gestational weight gain, would be negative (Christenson et al, 2018; Holton et al, 2017; McLeod et al 2012; Furness et al 2011). In a web-based survey, McLeod et al (2012) reported that in 78 midwives, the majority (69%) thought that it was feasible to offer diet and exercise advice to pregnant women living with obesity, however only 15% at that time did offer advice because they feared detrimentally affecting the relationship that they had with those women by their potential poor-handling of the situation. As the web-based survey was sent out to all practicing midwives in the study area ($n=241$) it could be argued that only those midwives who felt most strongly about the issue were motivated enough to complete the web-based survey and therefore the percentage of midwives who feel that it would be feasible to offer diet and exercise advice to women living with obesity, may be over-represented in the sample. Similarly, the gap between the percentage of midwives who thought it feasible to offer advice and those who actually did offer advice (54%), may also be overstated in this study. However, the findings of McLeod et al (2012) were supported by the stakeholder consultation data in Phase One of this thesis. Furthermore, the themes from the

small-scale qualitative study conducted by Furness et al (2011), that consulted midwives ($n=7$) and women living with obesity ($n=6$), were similar to Phase One themes in this study, and supported the findings both of this thesis, and of McLeod et al (2012). Furness et al (2011) reported the experiences of midwives who had encountered negative outcomes when they had attempted to communicate about obesity in pregnancy, with women. These midwives reported struggling to communicate positively and appropriately with women living with obesity about their weight and suggested that work needed to be done to enable them to manage this effectively. In semi-structured interviews about communicating about body weight with pregnant women, midwives reported avoiding discussion about weight with pregnant women, for fear of stigmatising women with a raised BMI (Christenson et al, 2018). Considering the findings of Phase One of this study, and supported by the literature that has been discussed, it was likely that the pre-intervention relationship between attitude and behavioural intention of the control group community midwives, indicated that the community midwives held negative beliefs about the outcome of offering support to obese pregnant women, with controlling their gestational weight gain.

Throughout the intervention period, control group community midwives came into contact with community midwives who were participating in the intervention group condition. Community midwives communicated with their colleagues from other teams in meetings, training days and at the maternity unit and therefore may have informally discussed the booklet and their involvement in the intervention. Furthermore, during the intervention period, some community midwives (who were not participating in the study) changed community teams and clinical bases such as Children's Centres, as a result of the rotation programme. There was therefore contact and possibly communication that was

related to the community midwives' involvement in this study which was difficult to control for.

There was anecdotal evidence that the intervention was being discussed between the community midwives and the Trust's Maternity Service and that the discussion was positive i.e. that the intervention group community midwives liked using the booklet and thought it was a good booklet. It was probable that the contact between control group community midwives and intervention group community midwives using the booklet and discussing it positively with their colleagues had positively influenced the attitudes of the control group community midwives. McLeod et al (2012) found that in their study, community midwives reported a willingness to share distributable booklets to pregnant women living with obesity; if available and provided for the community midwives. It was, therefore, possible that the knowledge that a distributable booklet now existed within the Trust's Maternity Service, and was being utilised successfully by their colleagues, led to a more positive attitude to offering support to pregnant women living with obesity, with controlling their gestational weight gain, in the control group community midwives. It was also likely that this 'positive contamination' effect influenced the change in the subjective norm that was seen in the post-intervention, control group community midwives, as it had with attitude.

At the post-intervention time point, there was no significant relationship between behavioural intention and actual behaviour in the control group midwives. Furthermore, there were no significant relationships between any of the TPB components and actual behaviour, post-intervention. It was possible that after the intervention period where control group community midwives were aware that their intervention group colleagues were using the booklet, they felt

disempowered as they had missed out on such a resource. In the themes from their grounded theory analysis of maternity healthcare practitioners, Furness et al (2015) identified there was a perceived need for additional training, supportive documentation and booklets, which supported the findings of Phase One of this thesis. The midwives that took part in this study discussed their need for further training and resources so that they could support women living with obesity in their care, with weight management. The results reported in this thesis suggested that their lack of access to resources for supporting women living with obesity with managing their gestational weight gain was brought to the fore for the control group community midwives, by the knowledge that their colleagues in the intervention group were using a booklet, and were discussing their experiences of utilising the booklet positively.

In the intervention group, the post-intervention Multiple Linear Regression analysis found that the TPB model was a significant predictor of the behavioural intention with subjective norm independently predicting behavioural intention. The statistical significance of the model's capability to predict behavioural intention was greater at this post-intervention time point than at the pre-intervention time point. This suggested that the intervention with community midwives was successful in increasing their intention to support women living with obesity, with controlling their gestational weight gain.

Large, positive, statistically significant correlations between *all* components of the TPB and behavioural intention were identified post-intervention, and subjective norm was a statistically significant predictor in the Multiple Linear Regression analysis. These results were indicative of the importance of the beliefs of others who were deemed important by the community midwives; regarding gestational weight management in women living with obesity. The

community midwives practised within teams, under the leadership of their Team Leaders, the Matron of Midwives Community and Postnatal, and the Head of Midwifery. Therefore, the beliefs of colleagues were most significant for community midwives with regards to the care of pregnant women. As has been previously discussed, this intervention study was endorsed by the Team Leaders, Matron of Midwives Community and Postnatal and the Head of Midwifery. Furthermore, the community midwives' participation in the study was encouraged by those staff members. The endorsement of this study by the Trust's Maternity Service was visible to community midwives in the intervention group throughout the intervention period, as the booklet and guidance for its use were distributed to the intervention group community midwives, by their Team Leaders. This finding was supported by the literature that identified subjective norm as the dominant TPB component for nurses and other health professionals, in predicting their intention to use clinical guidelines for their decision making regarding the future care of their patients (Kortteisto et al 2010).

At the post-intervention time point, the relationship between behavioural intention and actual behaviour was indicated by a large, statistically significant, positive correlation. Furthermore, the difference between actual behaviour scores in the t-test, measured at the pre-intervention time point and at the post-intervention time point, was also significant. This was the only paired-samples t-test that had measured a statistically significant change out of the four t-tests that were conducted (intention and actual behaviour x control and intervention groups). The t-test showed that community midwives who had participated in the intervention group had reported offering more weight management support to pregnant women living with obesity *after* the intervention than they did *before*. As previously discussed, subjective norm demonstrated the strongest relationship of any of the TPB components with *actual* behaviour. It was

therefore evident that in order for it to be successful, any intervention that sought to facilitate midwifery involvement in supporting weight management for women living with obesity must be endorsed by the colleagues of midwives, including their Team Leaders, and others working within the Maternity Service. The endorsement and ongoing visible support from the Trust's Maternity Service for this study were likely to have positively influenced the community midwives who were participating in the intervention group, by presenting a Maternity Service unified approach to the support of gestational weight management.

A number of the themes that had emerged in the Phase One consultation concerned the perceived lack of an established care pathway for health professionals, by which they could approach the management of gestational weight gain in women living with obesity. Creating a booklet for utility by the community midwives in the intervention group, which had been endorsed by their colleagues and the Maternity Service was the first step in addressing the lack of information and booklet available to community midwives. This exploratory trial of the intervention was a unique contribution to new knowledge concerning the research necessary to develop a comprehensive care pathway for pregnant women living with obesity concerning management of their gestational weight gain, that can be delivered by community midwives. Othman et al (2018) suggested that their systematic review of the evidence-based nutrition knowledge of midwives provided a clear rationale for developing an intervention that increased the belief of midwives in their own ability to support pregnant women with making healthy eating choices. It is argued that this intervention fulfilled this recommendation by enabling community midwives in the intervention group to experience actual control over whether they were able to offer tangible weight management support to pregnant women. It could be suggested that the utility of the booklet *plus* the endorsement for this study that

was given by the Maternity Service, produced a significant increase in *actual* support offered to women living with obesity to manage their gestational weight gain *after* the intervention group, community midwives' participation in the intervention. Ajzen (1985) stated that according to the TPB if the beliefs about a behaviour were sufficiently favourable then an intention to perform that behaviour would be formed. If subsequently the individuals were given a sufficient degree of actual control over the behaviour, then they would perform that intended behaviour. The TPB model in this study predicted 48% of the variance in the behavioural intention of community midwives in the intervention group, and a significant large correlation was found between behavioural intention and actual behaviour after midwives participation in the intervention. According to Ajzen's (1985) theory, the provision of a booklet gave community midwives in the intervention group, a sufficient degree of actual control over their behavioural intention and this was realised in a significant increase in actual behaviour from pre to post-intervention time point.

This study found no significant difference in the self-efficacy of the community midwives in the control and intervention groups between pre and post-intervention time points. Furthermore, self-efficacy did not influence either behavioural intention or actual behaviour of community midwives in either group. Anecdotally, community midwives reported to the researcher an enthusiasm to offer support to pregnant women living with obesity with controlling their gestational weight gain and suggested to the researcher that the barriers to offering support that they had previously experienced were fundamentally practical barriers, as opposed to barriers of self-doubt. Community midwives in both control and intervention groups scored almost identically as detailed in chapter 8. Furthermore, both the control and intervention community midwives scored consistently highly for self-efficacy at the pre and post-intervention time

points. This confirmed that self-efficacy beliefs did not influence the behavioural intention or actual behaviour of community midwives, and therefore are not considered further in discussion and inferences.

Evaluating and comparing the findings from the pre and post-intervention questionnaires of the control group and intervention group midwives, this study was able to answer the Phase Three research questions:

Did the provision of a relevant resource for community midwives, increase their intention to offer support to pregnant women living with obesity to control their gestational weight gain?

Yes, for the community midwives in this study, the provision of a relevant resource (the booklet) *increased* their intention to support women living with obesity, with managing their gestational weight gain. Whilst in the Multiple Logistic Regression (MLR) model, the TPB was a significant predictor of behavioural intention in the intervention group, at both the pre and post-intervention time points, the statistical significance had increased. Moreover, an examination of the correlations between the components of the TPB and behavioural intention supported this finding. In the intervention group, at the post-intervention time point, all three correlations were significant, compared with just one significant correlation at the pre-intervention time point. Furthermore, when comparing the results of the intervention group with the control group, in the control group, the TPB was not able to predict behavioural intention either before or after the intervention period, and there were no significant correlations between TPB components and behavioural intention in this group. Although the intervention group MLR predicted behavioural intention at the pre-intervention point, this was likely to be an effect of a methodological limitation in the design of the study that allowed aspects of the study to affect the

intervention group at the inception of the study. This methodological limitation is discussed in the forthcoming limitations section. Notwithstanding this, this study has found that the provision of relevant resource for community midwives, increased their intention to offer gestational weight management support to pregnant women living with obesity.

Did the provision of a relevant resource for community midwives increase their offers of support to pregnant women living with obesity, to control their gestational weight gain?

Yes. The Pearson's Product Moment Correlation Coefficient demonstrated universally large, positive increases in the relationships between the TPB components, behavioural intention and actual behaviour between pre and post-intervention, in the intervention group. This was not seen in the control group. Furthermore, the increase in actual behaviour score was statistically significant in the intervention group and not the control group. As the within-group t-test identified a significant before-and-after change in this group, this study demonstrated that the provision of a relevant resource for community midwives increased their offers of support to pregnant women living with obesity, to control their gestational weight gain.

Did the provision of a relevant resource for community midwives increase their self-efficacy regarding their capacity to support pregnant women living with obesity, with controlling their gestational weight gain?

Not in this study. As reported in chapter 8, the self-efficacy scores of the community midwives who participated in this study, were almost identical across groups and before and after the intervention period. In both control and intervention groups, self-efficacy score was high at both pre and post-intervention. Examination of the standard deviation for the self-efficacy scores

also did not differ significantly between control and intervention groups. This thesis, therefore, concluded that in this study, the provision of a relevant resource for community midwives did *not* increase their self-efficacy regarding their capacity to support pregnant women living with obesity with controlling their gestational weight gain.

9.4 The strengths and limitations of Phase Three

Phase Three, of this study, tested the intervention and the plan for its implementation, guided by the views and experiences of intervention users, and fulfilled the final step, step five, of the Intervention Mapping protocol (Bartholomew, 2001).

9.4.1 Strengths

Testing of the intervention found that provision of a relevant resource for community midwives increased their intention to offer support to pregnant women living with obesity, to control their gestational weight gain. Furthermore, Phase Three reported that self-reported actual offering of support to pregnant women living with obesity had increased in midwives who were in the intervention group. These promising Phase Three findings combine to offer a strong rationale for further testing of this intervention in a larger study, in order that inferences could be made from the quantitative analyses.

A very good participant retention rate (80%) was reported in Phase Three, which suggested that the retention strategy which had been utilised throughout the study (that is, the ongoing communication loop between the researcher and the midwifery service) was successful in enabling the researcher to maintain communication with participants throughout this phase. Furthermore, when participants had been transferred out of the team that they had been working in

during the course of the intervention period, as part of the rotation cycle that had been introduced, this ongoing communication enabled the researcher to locate participants at their new location, and conduct the post-intervention data collection.

Phase Three tested the research measure, i.e. the TPB questionnaire, that had been developed for this study. Although midwifery feedback on the TPB questionnaire, in the Phase Two pilot trial had suggested that some midwives found some of the questionnaire items awkward, or difficult to understand, in the Phase Three testing of the questionnaire, there were no significant missing data. Of the small amount of missing data present in the TPB questionnaire, there were no consistent patterns of missing data across the whole data set. It is suggested therefore that the changes that were made during the Pilot Trial, were effective at retaining the most relevant and useful items to the TPB scales, and those that had been deemed difficult to understand had been correctly identified and removed from the final scale that had been tested in Phase Three.

9.4.2. Limitations

The sample size in Phase Three of this study limited the generalisability of this phase's findings. Furthermore, as was the case with all phases of this study, participants were recruited from an area of the UK that has little diversity in terms of race, culture or ethnicity (ONS, 2011). These factors together limited any inferences that could be made regarding the efficacy of this intervention in a wider population. Although it was not possible to infer any effects of the intervention in the wider population, the findings in Phase Three have provided a rationale for testing the intervention with a larger scale study, and (with further development) in areas of greater diversity.

Although the pre-post intervention retention rate was very good in this phase (80%), a process evaluation was not conducted. It could be argued that the strong retention rate in this study suggested that something about the implementation and evaluation of the intervention was successful in engaging community midwives with the study. However, it had not been possible to evidence what aspects of the intervention worked well, or how the booklet was used (such as how many booklets were utilised in relation to the number of women who were identified as obese by midwives) which aspects could have been improved upon (if any) to increase retention rate further, in a future, larger-scale study.

9.5 The unique contribution to new knowledge, made by Phase Three

Phase Three of this study conducted the first level of testing of a novel health intervention, and as such contributed to new knowledge in the field of managing gestational weight gain, in pregnant women living with obesity. This study has reported results of the tests that were conducted in Phase Three and these have provided a rationale for future testing of this novel intervention, to examine whether the effects that were seen in this study's population, could be seen in a larger and more diverse population. Furthermore, the testing of the implementation plan in Phase Three contributed to new knowledge about the potential barriers to implementing this health intervention that had not been anticipated, these being organisational changes such as the change to a rotation pattern of working in different areas for midwives, and the uncertainty that they faced about the locations in which they may be working.

9.6 Strengths of the study

Although, as previously discussed, the Pragmatic Approach (Dudovskiy, 2018) (Dudovskiy, 2018) taken by this study resulted in some study limitations, i.e. that

the research had to work around the organisational changes in the Midwifery Service and personnel changes/losses; it could be argued that this Pragmatic Approach (Dudovskiy, 2018) allowed this study the flexibility to adapt aspects of the research and develop strategies that enabled the research to continue to completion of the project.

A strength of this study was the use of both qualitative and quantitative methods. In a synthesis of methodological literature concerning the use of mixed methods, Tariq et al (2013) suggested that using mixed methods in health research could aid understanding of complex health research problems. This study utilised an extensive qualitative phase to underpin a theoretically based understanding of the research area and to design and develop an intervention, and quantitative methods to test the utility and implementation of the intervention.

This study utilised a thorough intervention design methodology for developing a health psychology intervention throughout. A rigorous needs assessment gathered triangulated data from pregnant women living with obesity, and health professionals who cared for those women and these data were analysed using a guided and evidenced analytical method, i.e. Thematic Analysis (Braun et al, 2006). Furthermore, the potential limitations that have been reported concerning the flexibility of the thematic analysis method, were addressed within this study, by underpinning the analysis with health psychology theory, i.e. the Theory of Planned Behaviour (Ajzen, 1985). The application of health psychology theory to the analysis of data strengthened the study design by identifying determinants of the target behaviour and driving the design and development of the intervention.

A further strength of this research was the application of the guidance for developing a Theory of Planned Behaviour questionnaire in a new area/new population, to the development of this study's questionnaire. By following the

author's guidance (Ajzen, 2012), it could be suggested that the questionnaire development process for this study was rigorous. Item development was informed by the qualitative data as recommended by Ajzen (2012) thereby enhancing the relevance and appropriateness of scale items. Use of the TPB questionnaire that had been guided by the determinants of the target behaviour which had been identified during the needs assessment, enabled this study to measure not only overall change in behavioural intention but also provided insight into behavioural beliefs, normative beliefs and control beliefs. Utilising this questionnaire in a larger scale study could then provide insight into which theoretical components of the intervention may be having a greater or lesser effect, i.e. if it was perceived behavioural control that was low and impacting negatively on behavioural intention to use the booklet, a new aspect of the intervention could be to include training in order to development midwives confidence.

An important strength of this research was the relationship was formed between the researcher and the Trust's Midwifery Service. Bartholomew et al (2001) stated that it was important to establish a communication loop with the intended users of the health intervention, in order to interact and exchange information with them throughout the development of the intervention. This reciprocal interaction and exchange of information from the inception of this study enabled the Midwifery Service to work collaboratively with the researcher to find ways to overcome the challenges to the research, that had been posed by the organisational changes.

It was a strength of this study that the intervention had 'real world' impact. The intervention developed was requested, and has been used by, the Trust's antenatal service, after the cessation of this study. During the study period, the

researcher was contacted by a newly assigned 'Project Midwife' who had been given the task of developing a specialist antenatal service for women who had been identified as having a BMI ≥ 35 at their first antenatal appointment. Women were also able to self-refer to this service. The project midwife had heard about this study from midwives and had seen the resource being used in practice. The midwives had fed back to the project midwives that the resource was excellent and that their experiences of the study were positive. After cessation of the study, the specialist antenatal service requested use of the intervention, and all remaining intervention materials were distributed to them. The researcher was also asked to present the research at the local Supervisor of Midwives Meeting, and at the Trust's GP's Forum.

9.7 Limitations of the study

A limitation of this study was that a process evaluation was not conducted alongside the design and development of the intervention. Although this it was reported that the resource for midwives increased their intention to offer support and increased actual support offered; it was not possible to report *what* aspects of the intervention were working and *how* they were working. The intervention design methodology for this study followed the steps of Intervention Mapping (Bartholomew et al, 2001), however, it could be suggested that the intervention design could have been strengthened if the MRC (2006) guidelines for the design of complex interventions had been followed in addition to the Intervention Mapping protocol. MRC (2006) recommended that process evaluation should be conducted in tandem with the intervention development, to examine *what* is working in an intervention trial and *how*. Process evaluation may also have improved implementation by giving insight and understanding into how the environment and context in which the research was conducted may have

impacted on the efficacy of the intervention and may have helped to explain discrepancies between expected and observed outcomes.

The homogeneity of the research population was a limitation of this study. The South West England Trust in which this research was conducted is predominantly white British, with little demographic diversity. Although the booklet was reviewed by midwives and a Registered Dietitian in order to mitigate potential bias, this study could not infer how understandable, appropriate and/or useful the booklet might be in other populations with greater racial, ethnic and cultural diversity. In order to test whether the intervention could be considered to be 'effective' in a wider population, the intervention would need to be tested in a more diverse research population. Alongside testing the use of the booklet, this would give further insight into intervention implementation considerations that may not have emerged in this study.

In this study, midwives were assigned to either control group or intervention group condition *before* the pre-intervention/baseline questionnaires were completed. As has previously been discussed, it was possible that there were some effects of a condition already effective in the pre-intervention data, and this may have resulted in an under-representation of before and after effects in each condition. In a future trial, collecting baseline data from all participants before their allocation to condition should increase the robustness of the analyses.

It is possible that there were other factors that may have influenced the intention of community midwives to offer support to women living with obesity, that have not been captured in this research. The only personal data gathered from the community midwives who participated in Phase Three was their length of years in practice. Some literature has found that the BMI of health professionals may

influence attitude or behaviour with regards to their giving healthy weight advice. Overweight and obese health professionals reported that they had fewer successes in supporting people living with obesity to lose weight than their 'normal weight' counterparts (Bleich et al, 2014) and normal weight healthcare practitioners reported greater confidence and fewer barriers to weight management than their overweight counterparts (Zhu et al, 2011).

Although these studies found that the BMI of health professionals affected both confidence and effectiveness in the weight management of others in their care this study did not collect BMI information from midwives for two reasons. Firstly, the development of trust and rapport with the community midwives who were going to be asked to make changes to their practice was of primary concern to the researcher. Requesting to take the BMI of potential participants was likely to create a barrier to participation for some in what was a limited pool of potential participants. Secondly, in Phase One midwives said that their own BMI would not stop them offering support to pregnant women living with obesity. For midwives who stated in the focus groups and interviews that they would hesitate to offer weight control advice, there was a range of reasons stated. The main reasons were that midwives did not wish to offend women in their care, and lack of resources available to them. Where the weight of the midwives was talked about, some midwives felt that their slimness could potentially be a barrier to talking to women living with obesity as they would be perceived as 'not understanding.' However, they stated that it would not stop them offering support, and midwives with a raised BMI talked about using their own raised BMI as a tool to suggest empathy with an obese woman's situation. Phase One of this study found no qualitative evidence to suggest that the BMI of the community midwives would influence whether they offered support to women living with obesity with managing their gestational weight gain. As the rapport

and trust building with potential participants was the greater concern of this study the BMI of midwives was not taken. Whilst there is a 5% chance in any statistical test that the effect was seen may be the result of 'other factors' not accounted for by the test, the purpose of conducting quantitative analyses was to establish whether the effect that has been seen in the test, was statistically significant i.e. could be said to be the effect of the conditions tested. It is therefore suggested that although other factors could possibly have influenced the behaviour of the midwives who participated in this study, these should have been accounted for by the analyses.

9.8 Recommendations

Four community midwifery teams responded to the initial invitations to participate in this research. To minimise contamination effects, as community midwives worked very closely with their colleagues in their team; community midwives in the intervention group were requested not to discuss or share the booklet with community midwives from the control group, as recommended by Hertogh et al (2010). Furthermore, the researcher with the collaboration of the Team Leaders allocated two teams to control group and two to the intervention group, based on achieving equal numbers allocated to the control and intervention groups. Recruitment and retention in this study were excellent. The study recruited 29 out of 40 possible participants which amounted to a recruitment of 72.5% of possible participants. Furthermore, the study retained 83% of its original participants to complete the post-intervention questionnaire. Of the five participants that were lost between pre and post intervention time points, there were two participants who retired and one who took maternity leave. It is suggested therefore that the approach for recruitment which was tested in the Pilot Trial and refined for Phase Three was successful and the strategies for

minimising loss to trial between pre and post intervention time points, were effective. At the point in time in which the intervention was conducted, it had not been possible to recruit any greater number of participants simply because the Maternity Service was undergoing changes that were not fully established. There were however clear indications reported in the results of the quantitative analyses that a positive relationship existed between the use of the booklet in the intervention, and the intention and action of community midwives, to support women living with obesity, with their weight control.

It is argued that this study demonstrated that provision of the booklet, developed on a sound theoretical framework and guided and endorsed by Team leaders, increased both intention and action to support pregnant women living with obesity with weight control. The recommendation is made therefore a that further trial should be undertaken and that a greater number of Community Teams should be invited to participate now that the structural changes to the Maternity Service are fully embedded. The NHS trust in which this study was conducted was predominantly white, English speaking population, and therefore recommendation is made for a future multi-site study, that includes maternity services with diverse populations. If the methods for recruitment and retention of participants were successfully replicated across multiple sites, in a larger study, this could increase the robustness of the quantitative analyses.

Furthermore, the recommendation is that that in a further trial of the intervention, a post-intervention, qualitative study should be conducted utilising a semi-structured schedule to interview women and community midwives who had taken part in the intervention and therefore had experience of using the booklet in their midwifery practice. This qualitative data would reflect on the experience of community midwives and how the booklet was used, what worked and what

didn't and what could be done differently in the intervention, and this should be used to inform any further development and the implementation of the use of the booklet into future community midwifery practice.

Based on this collaborative work this thesis has developed a set of six principles guiding the implementation of the booklet into community midwifery practice in a further trial, driven by an evidence base.

1. Clear Guidance

It is recommended that clear guidance is provided to community midwives about how to broach the subject of gestational weight gain, in order that they feel confident about approaching women (evidence: Phase One data; Phase Three: negative correlation between attitude and behavioural intention).

2. Clear Training Materials

The provision of clear training materials for community midwives is recommended to enable them to feel confident in the support and information that they give to women (evidence: Phase One data; Phase Three: negative correlation between attitude and behavioural intention).

3. Shared Decision Making

It is recommended that a clear plan should be made by Team Leaders, in collaboration with the community midwives, to decide the antenatal appointment at which the booklet should first be given to women (evidence: Phase One data; Phase Three large, positive correlation between perceived behavioural control and behavioural intention).

4. Discretionary Decisions

The recommendation is made that Team Leaders should assure community midwives that the decision concerning whether they introduce the booklet to women at the planned time point remains at their discretion (evidence: Phase

One data, Phase Three large, positive correlation between perceived behavioural control and behavioural intention).

5. Booklet Ownership

It is recommended that Team Leaders should introduce the use of the booklet to their community midwives at team meetings. It is suggested that Team Leaders give brief overview of the booklet background (that the booklet and intervention was designed in collaboration with community midwives and pregnant women living with obesity) in order to encourage a sense of Maternity Service ownership of the booklet (evidence: Phase One data; Phase Three: strong positive correlation between subjective norm and behavioural intention; strongest influence in the model).

6. Sharing Booklet Experiences

Discussion with community midwifery colleagues during team meetings is encouraged to enhance knowledge and understanding through shared experiences of using the booklet to support gestational weight gain (evidence: Phase One data; Phase Three: strong positive correlation between subjective norm and behavioural intention; strongest influence in the model).

The utilisation of these principles should facilitate the implementation of this intervention with community midwives so that use of the booklet to support women whom they have identified as obese at the start of their pregnancy with controlling their gestational weight gain, is feasible and acceptable to them.

9.9 Conclusion: The contribution to new knowledge of the study

This thesis developed an intervention, a booklet and a standardised approach to addressing the subject of managing gestational weight gain in pregnant women living with obesity. This intervention was endorsed by the Maternity Service and was created to address the beliefs and concerns that community midwives held

regarding broaching the subject of obesity in pregnancy with women living with obesity and their own engagement with obesity in pregnancy. Furthermore, the content and the design of the booklet were developed after consultation with stakeholders including pregnant women living with obesity and community midwives with lived experience of obesity in maternity care, to address aspects of gestational weight gain in a booklet that was positive, informative and non-judgemental. A set of principles to guide the optimal implementation of the booklet into community midwifery practice was developed from the evidence base.

This thesis found that use of this booklet significantly improved the behavioural components of the TPB in community midwives in the intervention group, and strengthened their intention to offer women living with obesity support with controlling their gestational weight gain. Furthermore, this thesis found a significant positive relationship between the intention to offer support and the actual behaviour of community midwives in the intervention group. Community midwives in the intervention group were significantly more likely to have offered support to women living with obesity with controlling their gestational weight gain after participation in their intervention utilising the booklet, than prior to their participation in the intervention.

This study has made a unique contribution to new knowledge about increasing the intention of midwives to support pregnant women living with obesity, with managing their gestational weight gain. To date this study remains the only study that has utilised health psychology theory to conduct a substantial needs assessment with pregnant women living with obesity, and health professionals involved in her care, and from those data, developed and tested an intervention that sought to address the barriers that midwives perceived, to their providing

support to those women with managing their gestational weight gain. Heslehurst et al (2018) reported their plan for conducting a pilot feasibility study, concerning the development of an intervention for midwives, the GLOWING trial, to increase their involvement in the management of maternal obesity. Presently, however, the GLOWING trial remains in the development phase.

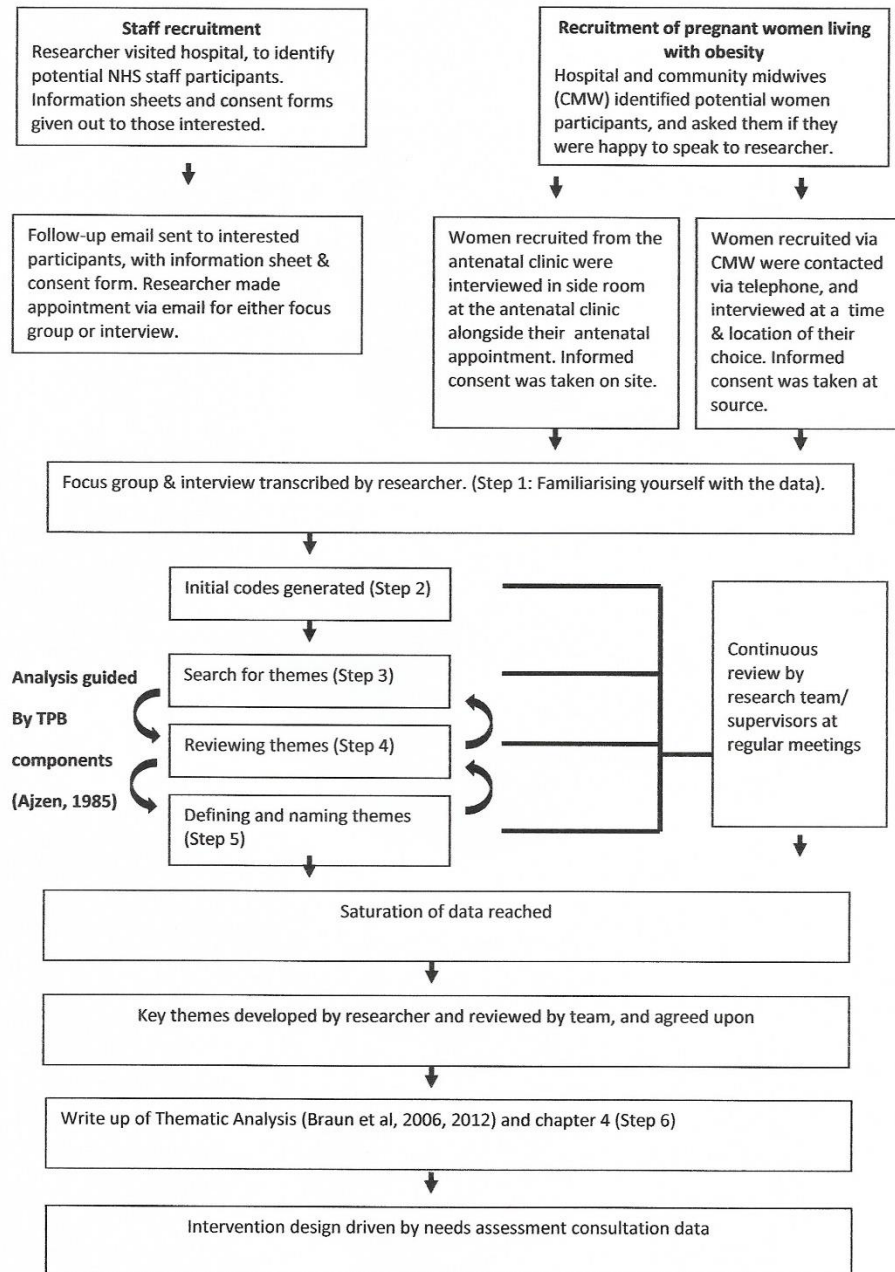
The unique contributions to new knowledge made by each phase of this study, have been detailed in chapters four, seven and nine, however drawing these novel contributions together this thesis has reported: the first extensive and robust qualitative needs assessment that had been underpinned by psychological theory, and that has reported the views and experiences of pregnant women living with obesity and maternity health professionals; the development and testing of a novel resource underpinned by psychological theory, for midwives to utilise in order to support pregnant women living with obesity and the development and testing of the health psychology theory (TPB) measurement instrument (the questionnaire) that was designed for use in a novel population (midwives) to measure a novel target behaviour (the intention to support pregnant women living with obesity). Furthermore, results from the testing of the intervention have provided a rationale for further testing of this intervention in diverse populations, for example in a multi-site study.

The research presented in this thesis has shown that the provision of a tangible booklet to be utilised by community midwives, in a trial of an intervention that was underpinned by a health psychology, theoretical framework, had increased the intention and actual behaviour of community midwives to offer support to women living with obesity, with controlling their gestational weight gain. This intervention trial, therefore, has provided the rationale for conducting a larger, diverse, multi-site trial of the intervention, in which the six guiding principles that

were developed as a part of this thesis, are implemented into the delivery of the booklet. Furthermore, a larger trial of the intervention should conduct a Process Evaluation, including interviews with midwives who have used the booklet in their practice, and pregnant women who have been in receipt of support that had utilised the booklet; to evidence the core components that make this intervention work, in order that this could be implemented into standard midwifery practice in the future

Appendix 1

Phase One process flowchart



NB: Steps 1- 6 from Thematic Analysis, Braun et al (2006, 2012).

Appendix 2

Interview/focus group schedule: Healthcare Professionals

- Greeting.
 - Feel free to talk about something that you feel is important-no rigid schedule, guideline schedule.
 - Confirm that the interview/group is going to be digitally recorded and check that participant(s) is/are happy to be recorded. (Similarly, if anyone wishes to take a comfort break then can leave and come back in)
 - If a participant wishes to leave the interview/group at any point confirm that they should feel completely comfortable and able to do that without explanation. If they also wish for what they have said so far to be removed, then that will be done during the transcription process.
 - A brief outline of the study
 - There are no right or wrong answers to the questions and that the participants will be treated with respect no matter what their beliefs.
-
1. As I don't know much about your role I'd like to start by asking you a little bit about your role within antenatal care. Do you work with many pregnant women? Specific clinics?
 2. What kinds of support do you offer obese pregnant women? (How is it delivered?)
 3. What other types/forms of support (if any) are you aware of that are available for obese pregnant women in your area who have concerns about their body weight and weight gain during pregnancy?
 4. Do you think that the information and advice on body weight and weight gain during pregnancy currently offered to women is easy to understand? And useful?
 5. Do you think that obese women who were worried about their body weight and weight gain during pregnancy would *want* additional support from other health care professionals or any other person or organization i.e. weight watchers?
 6. What kinds of things do you think would help obese pregnant women eat healthily?
 7. What kinds of things do you think would make it more difficult for obese pregnant women to eat healthily?
 8. If you think that obese pregnant women *would* value support from other health care professionals, another person or organization (such as

weight watchers); what form do you think this support and advice should take? (Prompts-some ideas might be: web-based support? a written programme? just informational support? Interactive support? Peer support?)

9. Is there anything else that anyone/you would like to add to the discussion about body weight and weight gain in pregnancy?

Appendix 3

Interview schedule: Women

- Greeting.
 - Feel free to talk about something that you feel is important-no rigid schedule, guideline schedule.
 - Confirm that the interview is going to be digitally recorded and check that participant is happy to be recorded. (Similarly, if anyone wishes to take a comfort break then can leave and come back in)
 - If a participant wishes to leave the interview at any point confirm that they should feel completely comfortable and able to do that without explanation. If they also wish for what they have said so far to be removed, then that will be done during the transcription process.
 - A brief outline of the study
 - There are no right or wrong answers to the questions and that the participants will be treated with respect no matter what their beliefs.
1. Firstly, can I ask a little about you and your pregnancy:
 - 1.1. How far into your pregnancy are you?
 - 1.2. Have you been well during your pregnancy so far?
 2. At your first pregnancy check-up were you weighed and measured?
 3. Did any health care professional talk to you about body weight and weight gain during pregnancy?
 4. What information or advice were you given? And by whom?
 5. Could you tell me about any advice about body weight and weight gain during pregnancy that you have wanted?
 6. Was any information that you received easy to understand? Useful?
 7. Is knowing about body weight and weight gain during pregnancy important to you?
 8. If you were worried about your body weight and weight gain during pregnancy would you **want** advice and support from a third party? Such as someone who was not a midwife-like another health care professional or any other person or organization?
 9. What kinds of things help you to eat more healthily?
 10. What kinds of things make it more difficult for you to eat healthily?
 11. If you did want support what form would this support and advice take? So what would work for you? (Prompts-some ideas might be: web-based support? a written programme? just informational support? Practical support like easy and cheap recipes/meal and snack ideas? Peer support?)

12. Is there anything else that anyone would like to add to the discussion about body weight and weight gain in pregnancy?

Appendix 4

Phase One: Information sheet: Midwives

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Clinical Contact:
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Supervisor:
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Plymouth University
gail.rees@plymouth.ac.uk
Tel: 01752 584647

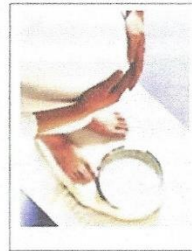
Exploring Midwives' Views of Weight Gain during Pregnancy

Participant Information Leaflet

This study is part of a postgraduate degree requirement.

The normal NHS complaints mechanism is available to you if you wish to complain about any way you are approached or treated during this project.

If you feel your complaint has not been resolved please contact the secretary to the Faculty of Science and Technology Human Ethics Committee.
Mrs Paula Simson
01752 584503.



01/07/2010 version 2

We would like to invite you to take part in a focus group looking at weight gain in pregnancy.

Recently there have been many studies examining the relationship between excessive weight gain in pregnancy and adverse pregnancy outcome, especially in women who are obese or overweight prior to conception.

We acknowledge as a midwife you have experience of caring for women within these categories. We would like to hear your views on:

- What advice you give to pregnant women about weight.
- Caring for women who are obese or overweight.
- What intervention you have used or have been involved with (if any) that has assisted women in restricting excessive weight gain in pregnancy.

If you have any further questions please do not hesitate to contact one of the project team listed on the back of this leaflet.

Below are some questions people often ask about research and our answers:

Who has approved this project?

The NHS Research Ethics Committee for Plymouth has reviewed the project and given its ethical approval Ref: 10/H0203/37

Why have I been chosen to take part?

All midwives within the Plymouth area will be invited to take part.

Your participation is voluntary.

What would be involved in taking part?

We would like to invite you to a small group to discuss your own thoughts and experiences surrounding weight gain in pregnancy and tell us what you think a weight control intervention should look like.

An interview will be available if you are unable to attend a focus group

What if I change my mind?

You can withdraw from the project at any time without having to give an explanation. This will have no effect on your current or future employment.

Will taking part be of any benefit to me?

Perhaps not directly but your views will be used to design a weight control intervention in pregnancy. This will help us plan an intervention that people would want to take part in and would work for them. This will ultimately be used to improve patient care.

Are there disadvantages to taking part?

We recognise taking part will take up a little of your time. We will do our best to minimise any inconvenience by ensuring that the group is at a time and place convenient for you. We do not expect anyone to suffer any harm or injury as a result of participating in this project.

Will what I say during the focus group be confidential?

The group will be digitally recorded with your signed consent. The group will be transcribed by the researcher who will not use your name on the transcript or at any point. You will receive your own code which will be the only link to you and this code will be stored separately on a computer that is secure and accessible only by the research team. The code will allow us to remove your data from the project if you change your mind after participating.

What if I have any concerns?

If you think of questions about the project please feel free to contact the research team using the contact details on the back of this leaflet.

How and where will the results be published?

We plan to publish our results in academic and professional journals, local NCT newsletters, present at midwifery team meetings and conferences to associations involved in improving care for women. We will send you a summary of the research findings when the project is complete.

Thank you for reading this leaflet and for considering helping with this study

01/07/2010 version 2

Appendix 5

Phase One: Information sheet: Women

Researcher:
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Clinical Contact:
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Acting Head of Midwifery
Maternity Unit
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Plymouth NHS Hospital Trust
01752 763625

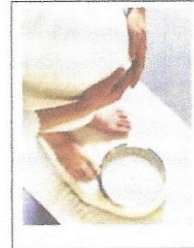
Exploring Pregnant Women's Views of Weight Gain in Pregnancy

Participant Information Leaflet

This study is part of a postgraduate degree requirement.

The normal NHS complaints mechanism is available to you if you wish to complain about any way you are approached or treated during this project.

If you feel your complaint has not been resolved please contact the secretary to the Faculty of Science and Technology Human Ethics Committee.
Mrs Paula Simson
01752 584503.



01/07/2010 version 2.

We would like to invite you to take part in a discussion group looking at weight gain in pregnancy.

There have been studies undertaken looking at pregnancy and birth in relation to the mother's weight.

We want to find out what women feel about weight gain in pregnancy to help us understand what might be helpful for women who are overweight during pregnancy.

If you have any further questions please do not hesitate to contact one of the project team listed on the back of this leaflet.

Below are some questions people often ask about research and our answers:

Who has approved this project?

The NHS Research Ethics Committee for Plymouth has reviewed the project and given its ethical approval (number to be inserted once approval given)

Why have I been chosen to take part?

All pregnant women in the Plymouth area will be invited to take part.

Your participation in this study is voluntary.

What would be involved in taking part?

We would like to invite you to a small group to discuss your own thoughts and experiences surrounding weight gain in pregnancy and tell us what you think a weight control intervention should consist of.

An interview will be available if you are unable to attend a focus group

What if I change my mind?

You can withdraw from the discussion group at any time without having to give an explanation, and without your care being affected in any way.

Will taking part be of any benefit to me?

Perhaps not directly, your views will be important so that we can design a weight control intervention in pregnancy. This will help us plan an intervention that people would want to take part in and would work for them.

Are there disadvantages to taking part?

We recognise taking part will take up a little of your time. We will do our best to minimise any inconvenience by ensuring that the group is at a time and place convenient for you. We do not expect anyone to suffer any harm or injury as a result of participating in this project.

Will what I say during the focus group be confidential?

The group will be digitally recorded with your signed consent. The group will be transcribed by the researcher who will not use your name on the transcript or at any point. You will receive your own code which will be the only link to you and this code will be stored separately on a computer that is secure and accessible only by the research team. The code will allow us to remove your data from the project if you change your mind after participating.

What if I have any concerns?

If you think of questions or feel anxious about the project please feel free to contact the research team using the contact details on the back of this leaflet. We will be happy to discuss your concerns and/or put you in touch with someone who will be able to help.

How and where will the results be published?

We plan to publish our results in the local NCT newsletter, academic and professional journals, at conferences and to associations involved in improving care for women. We will send you a summary of the research findings when the project is complete.

Thank you for reading this leaflet and for considering helping with this project.

01/07/2010 version 2.

Appendix 6

Phase One: Information sheet: Dietitians

Researcher:
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Supervisor:
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Exploring Dietitians' Views of Weight Gain during Pregnancy

Participant Information Leaflet

This study is part of a postgraduate degree requirement.

The normal NHS complaints mechanism is available to you if you wish to complain about any way you are approached or treated during this project.

If you feel your complaint has not been resolved please contact the secretary to the Faculty of Science and Technology Human Ethics Committee.
Mrs Paula Simson
01752 584503.



01/07/2010 version 2

We would like to invite you to take part in a focus group looking at weight gain in pregnancy.

Recently there have been many studies examining the relationship between excessive weight gain in pregnancy and adverse pregnancy outcome, especially in women who are obese or overweight prior to conception.

We acknowledge as a dietitian you have experience of caring for women within these categories. We would like to hear your views on:

- Caring for women who are obese or overweight.
- What advice you give to women in pregnancy concerning weight.
- What intervention you have used or have been involved with (if any) that has assisted women in restricting excessive weight gain in pregnancy.

If you have any further questions please do not hesitate to contact one of the project team listed on the back of this leaflet.

Below are some questions people often ask about research and our answers:

Who has approved this project?

The NHS Research Ethics Committee for Plymouth has reviewed the project and given its ethical approval (number to be inserted once approval given)

Why have I been chosen to take part?

All dietitians working within the Trust have been invited to take part.

Your participation is voluntary.

What would be involved in taking part?

We would like to invite you to a focus group to discuss your own thoughts and experiences surrounding weight gain in pregnancy and tell us what you think a weight control intervention should look like.

An interview will be available if you are unable to attend a focus group

What if I change my mind?

You can withdraw from the project at any time without having to give an explanation. This will have no effect on your current or future employment.

Will taking part be of any benefit to me?

Perhaps not directly but your views will be used to design a weight control intervention in pregnancy. This will help us plan an intervention that people would want to take part in and would work for them. This will ultimately be used to improve patient care.

Are there disadvantages to taking part?

We recognise taking part will take up a little of your time. We will do our best to minimise any inconvenience by ensuring that the group is at a time and place convenient for you. We do not expect anyone to suffer any harm or injury as a result of participating in this project.

Will what I say during the focus group be confidential?

The group will be digitally recorded with your signed consent. The group will be transcribed by the researcher who will not use your name on the transcript or at any point. You will receive your own code which will be the only link to you and this code will be stored separately on a computer that is secure and accessible only by the research team. The code will allow us to remove your data from the project if you change your mind after participating.

What if I have any concerns?

If you think of any questions about the project please feel free to contact the research team using the contact details on the back of this leaflet.

How and where will the results be published?

We plan to publish our results in academic and professional journals, at conferences to associations involved in improving care for women and the local NCT newsletter. We will send you a summary of the research findings when the project is complete.

Thank you for reading this leaflet and for considering helping with this project

01/07/2010 version 2

Appendix 7

Phase One: Information sheet: Doctors

Researcher:
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Clinical Contact:
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Acting Head of Midwifery
Maternity Unit
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Plymouth NHS Hospital Trust
01752 763625

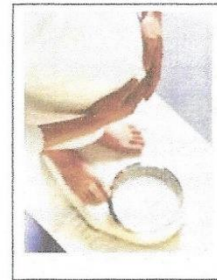
Exploring Doctors' Views of Weight Gain during Pregnancy

Participant Information Leaflet

This study is part of a postgraduate degree requirement.

The normal NHS complaints mechanism is available to you if you wish to complain about any way you are approached or treated during this project.

If you feel your complaint has not been resolved please contact the secretary to the Faculty of Science and Technology Human Ethics Committee.
Mrs Paula Simson
01752 584503.



01/07/2010 version 2

We would like to invite you to take part in a focus group looking at weight gain in pregnancy.

Recently there have been many studies examining the relationship between excessive weight gain in pregnancy and adverse pregnancy outcome, especially in women who are obese or overweight prior to conception.

We acknowledge as a doctor you have experience of caring for women within these categories. We would like to hear your views on:

- Caring for women who are obese or overweight.
- What advice you give to women in pregnancy concerning weight.
- What intervention you have used or have been involved with (if any) that has assisted women in restricting excessive weight gain in pregnancy.

If you have any further questions please do not hesitate to contact one of the project team listed on the back of this leaflet.

Below are some questions people often ask about research and our answers:

Who has approved this project?

The NHS Research Ethics Committee for Plymouth has reviewed the project and given its ethical approval (number to be inserted once approval given)

Why have I been chosen to take part?

All doctors working within the clinical speciality of obstetrics have been invited to take part.

Your participation is voluntary.

What would be involved in taking part?

We would like to invite you to a focus group to discuss your own thoughts and experiences surrounding weight gain in pregnancy and tell us what you think a weight control intervention should look like.

An interview will be available if you are unable to attend a focus group

What if I change my mind?

You can withdraw from the project at any time without having to give an explanation. This will have no effect on your current or future employment.

Will taking part be of any benefit to me?

Perhaps not directly but your views will be used to design a weight control intervention in pregnancy. This will help us plan an intervention that people would want to take part in and would work for them. This will ultimately be used to improve patient care.

Are there disadvantages to taking part?

We recognise taking part will take up a little of your time. We will do our best to minimise any inconvenience by ensuring that the group is at a time and place convenient for you. We do not expect anyone to suffer any harm or injury as a result of participating in this project.

Will what I say during the focus group be confidential?

The group will be digitally recorded with your signed consent. The group will be transcribed by the researcher who will not use your name on the transcript or at any point. You will receive your own code which will be the only link to you and this code will be stored separately on a computer that is secure and accessible only by the research team. The code will allow us to remove your data from the project if you change your mind after participating.

What if I have any concerns?

If you think of any questions about the project please feel free to contact the research team using the contact details on the back of this leaflet.

How and where will the results be published?

We plan to publish our results in academic and professional journals, at conferences to associations involved in improving care for women and the local NCT newsletter. We will send you a summary of the research findings when the project is complete.

Thank you for reading this leaflet and for considering helping with this project

01/07/2010 version 2



Focus Group Consent Form

Participant Number:

Title of Project: Controlling gestational weight gain: the views and experiences of pregnant women, and healthcare professionals

Name of Researcher: Emma Hazeldine

Please initial or tick the boxes below.

1. I confirm that I have read and understood the information sheet for the above study. ☐
2. I agree to take part in a focus group about gestational weight control and experiences relating to weight gain in pregnancy. ☐
3. I understand that the focus group will be digitally recorded. ☐
4. I agree to the use of anonymised quotations in the study write up. ☐
5. I understand that I am free to withdraw at any time and that if I withdraw from the study if requested any information provided by me will be destroyed. ☐
6. I agree to take part in the above study. ☐

Name

Date:

Signature:

Email address:

Researcher: **Emma Hazeldine**

Date:

Signature:



Interview Consent Form

Participant Number:

Title of Project: Controlling gestational weight gain: the views and experiences of pregnant women, and healthcare professionals

Name of Researcher: Emma Hazeldine

Please initial or tick the boxes below.

3. I confirm that I have read and understood the information sheet for the above study. ☐
4. I agree to take part in an interview about gestational weight control and experiences relating to weight gain in pregnancy. ☐
7. I understand that the interview will be digitally recorded. ☐
8. I agree to the use of anonymised quotations in the study write up. ☐
9. I understand that I am free to withdraw at any time and that if I withdraw from the study if requested any information provided by me will be destroyed. ☐
10. I agree to take part in the above study. ☐

Name

Date:

Signature:

Email address:

Researcher: **Emma Hazeldine**

Date:

Signature:

Appendix 10

Phase One process: Example of research team feedback on schedule for women

Focus group schedule. Stage 1. Version 1. Women

Focus group schedule: Women

- Welcome to group.
- Group guidelines: i) trying not to talk over others (makes transcribing difficult and what you say if often lost); ii) free to talk about something that you feel is important-no rigid schedule, guideline schedule.
- Confirm that the focus group is going to be digitally recorded and check that all participants are happy to be recorded. (Similarly if anyone wishes to take a comfort break then can leave and come back in-pregnant ladies!)
- If participants wish to leave the group at any point confirm that they should feel completely comfortable and able to do that without explanation. If they also wish for what they have said so far to be removed then that will be done during the transcription process.
- Brief outline of study

1. Age
2. Relationship status
3. Firstly can I ask a little about you and your pregnancy:
 - 3.1. How far into your pregnancy are you?
 - 3.2. Have you been well during your pregnancy so far?
4. At your first pregnancy check up were you weighed and measured?
5. Did any health care professional talk to you about body weight and weight gain during pregnancy?
6. What information or advice were you given? And by whom?
7. Did you **want** advice about body weight and weight gain during pregnancy?
8. Was any information that you received easy to understand? Useful?
9. Is **thinking** about body weight and weight gain during pregnancy important to you?
10. If you were worried about your body weight and weight gain during pregnancy would you **want** advice and support from a **third party**?
11. What kinds of things help you **stick to healthy eating**?
12. What kinds of things make it more difficult for you to eat healthily?

Commented [g1]: Do they need to say this. Would it be better to get privately - say on the consent form?

Commented [g2]: Ditto. It just might be a bit off-putting if your partner has left you, or you are the only one who is single.

Commented [g3]: Knowing about rather than just thinking about?

Commented [g4]: Do you mean - someone who isn't a midwife?

Commented [g5]: Might be best to find out what they think healthy eating is and what makes it easier for them. 'Sticking' to it makes it sound like a diet which we want to avoid.

Schedule page 1.

Focus group schedule. Stage 1. Version 1. Women

13. If you did want support from a third party, what form would this support and advice take? So what would work for you? (Prompts-some ideas might be: web based support? a written programme? just informational support? Interactive support? Peer support?)
14. Is there anything else that anyone would like to add to the discussion about body weight and weight gain in pregnancy?

Commented [g6]: Do you need to say third party?

Commented [g7]: Not sure what you mean here. How about practical support like easy and cheap recipes / meal / snack ideas.

Commented [g8]: Generally quite a lot to discuss. Make sure you get the last points in as important.

Appendix 11

Phase One process: Example of research team feedback on schedule for midwives

Focus group schedule. Stage 1. Version 1. Midwives

Focus group schedule: Midwives

- Welcome to group.
- Group guidelines: i) trying not to talk over others (makes transcribing difficult and what you say if often lost); ii) free to talk about something that you feel is important-no rigid schedule, guideline schedule.
- Confirm that the focus group is going to be digitally recorded and check that all participants are happy to be recorded. (Similarly if anyone wishes to take a comfort break then can leave and come back in-)
- If participants wish to leave the group at any point confirm that they should feel completely comfortable and able to do that without explanation. If they also wish for what they have said so far to be removed then that will be done during the transcription process.
- Brief outline of study

Deleted: pregnant ladies

1. Could you tell me a little bit about the process when a woman comes for her first antenatal appointment: Do you routinely weight and measure women? Do you calculate Body Mass Index?
2. Do you routinely give advice at antenatal appointments about body weight and weight gain during pregnancy?
3. Do you feel comfortable talking to women about their body weight and weight gain in pregnancy?
4. If you *don't routinely* offer advice on body weight and weight gain in pregnancy, do you offer any advice to women whom you feel may have risks to their health associated with their weight during pregnancy?
5. Do you think information and advice on body weight and weight gain in pregnancy offered to women is easy to understand? And useful?
6. If you have identified a woman as obese at the start of her pregnancy what support and advice is available to her in your area (that can be via you, primary care, hospital or other)?
7. What is your view of the support currently available to obese women who would like help with issues around body weight and weight control during pregnancy?

Schedule page 1.

Focus group schedule. Stage 1. Version 1. Midwives

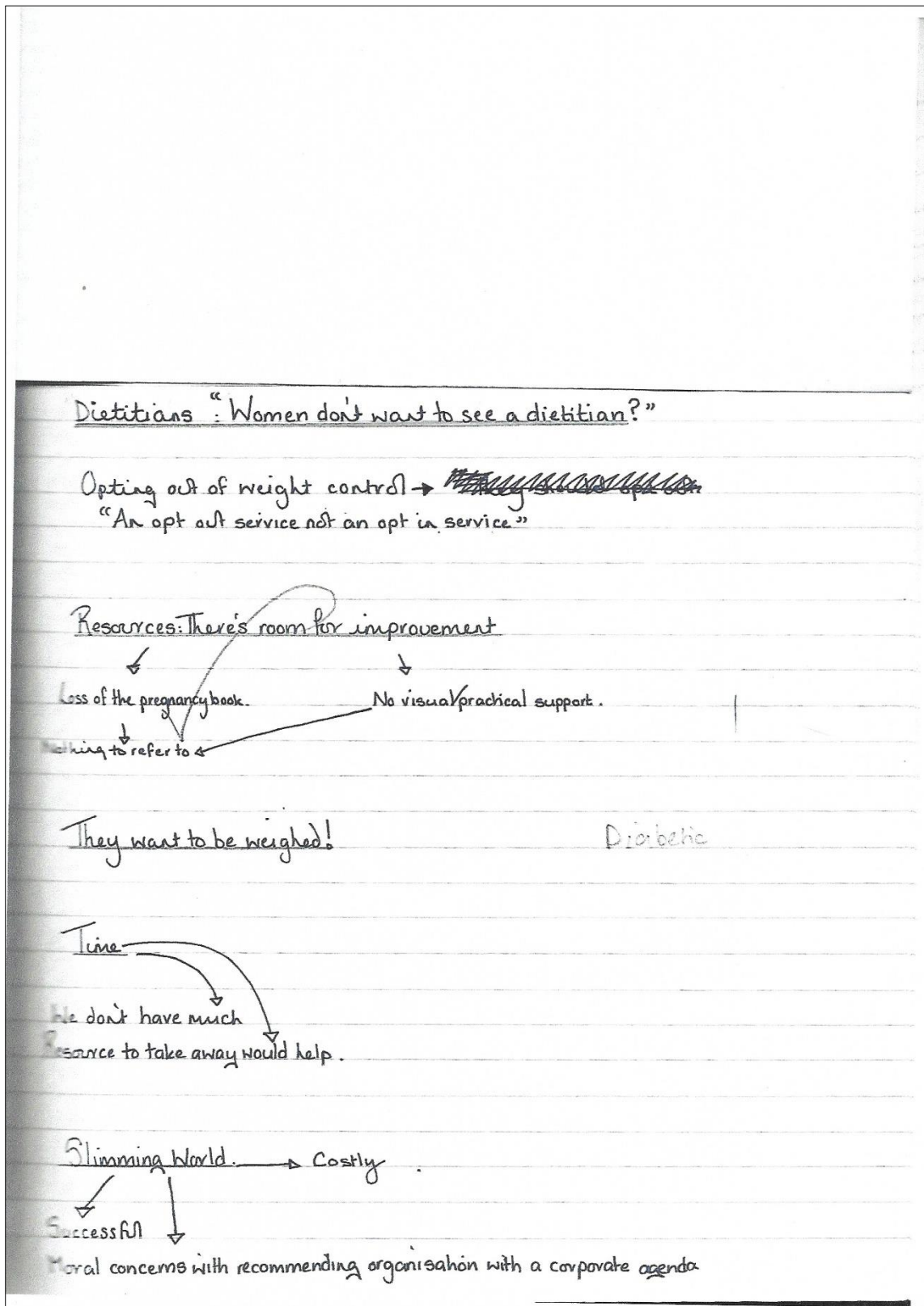
8. Do you think that obese women who were worried about their body weight and weight gain during pregnancy would *want* advice and support from a third party?
9. What kinds of things do you think would help obese pregnant women *stick to* healthy eating?
10. What kinds of things do you think would make it more difficult for obese pregnant women to eat healthily?
11. If you think that obese pregnant women *would* value support from a third party; what form do you think this support and advice should take? (Prompts-some ideas might be: web based support? a written programme? just informational support? Interactive support? Peer support?)
12. Is there anything else that anyone would like to add to the discussion about body weight and weight gain in pregnancy?

Commented [g1]: Avoid – just say eat more healthily

Schedule page 2.

Appendix 12

Phase One process: Excerpts of initial observations from data, made by the researcher



Initial observations page one.

Women

Confusing messages

Information would be nice

Concerns about (unnecessary weight gain)
"Only one concerned about my weight"

Opt out/in

Easy, cheap, quick ideas

Proportional risk

4 aspects.

Initial observations page two.

Appendix 13

Phase One process: Example of coded participant transcript

Midwife focus group

Some people will
NOT be interested

gateway into
discussion around
as necessary
process - trigger?

broaching the
subject

Unclear of
referral point
Not clear
pathway

Unclear of
referral point
BMI 30 +

Unclear of
pathway
unclear area
unclear
for
HPV

338 think women aren't silly and they recognise that it's not

339 health for them to be overweight and you know it actually

340 leads to other complications outside of pregnancy doesn't

341 it?

342 I: Um

343 MW2: but I don't know...I think...I think certain groups

344 would and certain groups wouldn't and I think that's the

345 same with all

346 I: Yeah

347 MW2: with all of the advice that we try to give

348 MW3: because of the anaesthetic referrals if they've

349 come in then that's made it a bit easier to broach the

350 subject because you do have to explain that because of

351 your raised BMI we are going to have to refer you as one

352 of the

353 I: so what BMI do you have to refer for an anaesthetic

354 referral review?

355 MW2: I thought it was over 30...or was it...?

356 MW1: I was going to say or was it over 35?

357 MW3: but there's other erm...

358 MW2: criteria?

359

360 MW3: yeah...on there as well and I think if they've

361 got...if they've had a previous reaction you can refer if

362 they're over 30 or something like that if they've got more

363 than two of them I think the standard drops I think

364 MW2: okay if there's other...

365 MW3: well you are [unclear]

366 MW2: Yeah I haven't seen that form

367 I: Yeah

368 MW2: Because it's obviously new since I've been out

11

Midwife transcript page one.

369 I: so you have to have raised BMI plus something else
370 does it or...?

371 MW3: No its if it's above...I think if it's greater than 35
372 you refer

373 I: Yeah

374 MW3: point blank you refer straight away but I think it's if
375 it's above 30 and they've had sort of previous reaction or
376 they've got a specific allergic reaction as well

377 I: Okay

378 MW3: but again I'm not entirely sure

379 I: Okay so what kinds of things do you think erm, would
380 help obese, pregnant women eat more healthily?

381 [Long pause]

382 MW3: I think they've got to want to do it

383 MWs: Um

384 MW3: Like all the Healthy Start things...I've had women
385 come in and say "Oh great I can get Healthy Start
386 vouchers" and even though it's tokens for shopping they
387 don't see it as an opportunity to "right I can go out and I
388 can definitely get my fruit and veg" they see it as "I've got
389 some extra money towards my shopping"

390 I: Um

391 MW2: I think cost is definitely an implication

392 I: Right

393 MW2: because I think perhaps it is more expensive to be
394 really healthy then going and buying processed food

395 I: Yeah

396 MW1: And time as well. To make something from scratch
397 takes considerably longer than bunging a Tesco's
398 whatever in the microwave...yeah

399 [Pause and much giggling!!]

400 I: Everybody's chucking there

Importance of motivation / Salience
Motivation
Importance of motivation / meaning / stress
Cost barrier to healthy eating perceived cost barrier
perceived time barrier

Difficulty reaching a consensus for the point which referral for anaesthetic review is made.

Midwife transcript page two.

Appendix 14 **Phase One process: Examples of coded participant transcript** **Dietitian focus group**

	247	I: So do you think that the information and advice on
	248	bodyweight and weight gain in pregnancy, not specifically
	249	for obese women but body weight and weight gain in
	250	pregnancy, currently offered to women is easy to
	251	understand and useful?
Advice about weight gain in pregnancy not clear and not specific.	252	D1: I don't think they have any guidelines specifically
	253	other than people gain varying amounts of weight but in
	254	general isn't it somewhere between 10 kilos and it's like a
	255	really wide range isn't it? So I don't think it's really very
	256	specific
"	257	D2: Certainly from personal experience I was given no
	258	guidelines of what kind of weight gain I should...would be
	259	normal
	260	I: Yes
	261	D2: Um so I don't think it's particularly clear
	262	I: No
Still myths and misunderstandings.	263	D2: what is normal weight gain and all the messages
	264	about y'know "Oh you can eat for two" and all of that I
	265	think is very commonly still expressed

Information pack	309	D3: Yeah I think it is but I can't quite remember it's quite
	310	a thick book with all your information in that you should,
	311	should be trying to follow but no guidelines for whether
	312	I: Um
	313	D3: if you start off overweight
Information not clear not specific not easy to understand	314	I: Yes
	315	D3: no mention of that actually
	316	I: well even within normal weight there's obviously a
	317	massive difference in height and build and activity level
	318	and all of those things
	319	Ds: Yeah um
	320	I: So I imagine it's erm, unless you kind of know already
	321	its quite difficult to find out where you should be
No information about activity	322	D2: Yeah I'd say that about activity level as well. The
	323	guideline for what activity you can do and how much
	324	when you're pregnant as well
	325	I: um
Advice unclear	326	D2: I can't remember it being particularly clear in any of
	327	the advice that I was given

Appendix 15 **Phase One process: Examples of coded participant transcript** **Doctor 1 interview**

utilising pre-existent resources?	{	143	D: Erm, well there's the ones that are available to anybody erm, people pick up Weight Watchers and Slimming World
		144	
		145	
		146	I: Yep
		147	D: and people do use those quite a bit and people either
		148	get on with them or they don't
		149	I: Do they get signposted in that direction from within
		150	antenatal or...?
Not aware of recommendations / support	{	151	D: I don't know that they do. I don't know. Now that you
		152	raise it I don't know that they would...it's strange that you
		153	ask questions and I think "No it's a very good point", and I
		154	am not sure whether I know the answer whether they
		155	would be very happy to take on somebody who is
		156	pregnant
		157	I: Um
Not referred for support	{	158	D: and that...I don't...I haven't personally I haven't
		159	pointed anybody in the direction of that sort of set up in
		160	pregnancy. My guess is that it is more sort of gynae
		161	women that are wanting surgery that they're much too big
		162	for and...and as you say what is there? Erm, GP
Maybe GP support	{	163	surgeries may have erm, some form of dietetic support
		164	erm, but I think that's pretty limited
		165	I: Yes
dietary support via gestational diabetes	{	166	D: Erm and I think within the hospital there are dietitians
		167	for diabetic women...some erm, gestational diabetics
		168	I: Yes
can make entirely weight-based dietary support referral but not done in practice?	{	169	D: in pregnancy they clearly get dietitian input but I erm,
		170	erm and there is in the guideline that because I did
		171	double-check that there is the suggestion that when we
		172	can [unclear] or refer to dietitians without being diabetic
		173	but I have to confess I haven't done it. Now that's
		174	possible my lack erm, y'know so it's very interesting
		175	having someone like you coming along saying "what do
		176	you do?" [Laughs] Possibly I could do more you know?
		177	It...I said at the beginning it is sort of an inevitability you
		178	are faced with someone who is really big
		179	I: Um

Appendix 16 **Phase One process: Examples of coded participant transcript** **Doctor 2 interview**

Responsibility of others / MNs	211	D: Erm, that is a midwifery issue more than a doctor-ish
	212	one
Not doctor responsibility leaflet = informational support eating	213	I: Yeah
	214	D: I mean I do when I've got a spare five minute [laughs]
	215	idly pick up information that is handed out to pregnant
	216	women and there is stuff about healthy eating
Healthy eating not	217	I: That's in leaflet form is it?
	218	D: Erm, yes, don't press me too hard because I've not
	219	[laughs]
	220	I: [Laughs] no its not...
leaflet = informational support	221	D: I can't remember
	222	I: that's as far as I was going [laughs]
	223	D: Yeah in leaflet form...a booklet I think, the pregnancy
	224	booklet erm...and it's pretty clear
Healthy eating minimising risk rather than weight	225	I: It's quite accessible?
	226	D: ...oh yeah I mean a lot...a lot of the healthy eating
	227	thing is you know they have to cover everything but it did
	228	cover everything especially in the booking visit but is also
Not aware of how much about healthy weight eating	229	involves avoiding or minimising risk of listeria and things
	230	like that so it's all wrapped up in the same area
	231	I: Yeah
	232	D: but I can't, y'know without checking I couldn't say how
Like smoking? How?	233	much was erm, sort of healthy eating and avoidance of
	234	putting on excessive weight but I think they talk about
	235	balanced diet and you know proper dairy products and
	236	calcium intake and
	237	I: Yeah
	238	D: vegetables
	239	I: So do you think erm, obese women who are worried
	240	about their body weight and weight gain in pregnancy
	241	would want additional support?
	242	D: Erm, some would and some wouldn't. That's...I know
	243	that's a stupid answer but erm, you get...I suppose it's
	244	equivalent to the smoking where some women recognise

Appendix 17

Phase One process: Examples from researchers notebook of theme development

"do you feel there is much support within the NHS?"
 MW "No! I'm sure there isn't" **LIMITED RESOURCES**

"it's very similar to smoking cessation, one or two or sometimes 3 times a week one of the ~~midwives~~ midwives will contact them..." **SMOKING**

* "a practice nurse will think with a BMI of 30, in comparison to the rest of ^{the} population this person is not overweight"

"we really haven't got the resources to do it" **STRETCHED RESOURCES**

* "I think if we could offer them something local... in some ways them paying a small amount for it would probably be a good thing... acceptable and I think more of an incentive. If you are paying for it you want something back."

X "and you'd almost need it to be an opt out service like the smoking #... where as it ~~every woman was~~ over 35 was automatically so it stops being quite such a taboo thing because it's something which happens to everybody" **MAKE IT OPT OUT LIKE SMOKING?**

"they are more aware of what they eat when they're pregnant" **PREGNANCY - MOTIVATION?**
-TRIGGER FOR CHANGE?

"you can see when the woman is overweight, the bloke usually is as well and you see them the next day pushing a trolley round Iceland with a load of ready meals in" **ROLE OF FAMILY**

"they're not taught @ school to cook anymore. When I was in school..." **EDUCATION**

Researcher's notebook theme development page one

Stickers trigger discussion

"Does everybody know the recommended weight gain for each of the weight categories?" "No No"

"Not for the weight categories" "My understand was that it was with a normal BMI it should be 2 maybe 3 stone but if your BMI is raised it should be less... less than 2 stone but actually what they should aim for is to end their pregnancy at the weight they started" MW2

No specific guidance on BW + GWG (or not known universally)

MW3 "I find it difficult. We had it thrown back in my face before. Literally all we said is about Body Mass Index and they're complaining. ~~Beaching~~ I was horrible apparently." Discussion = mixed reception.

THE SUBJECT - CONCERN OF OFFENDING

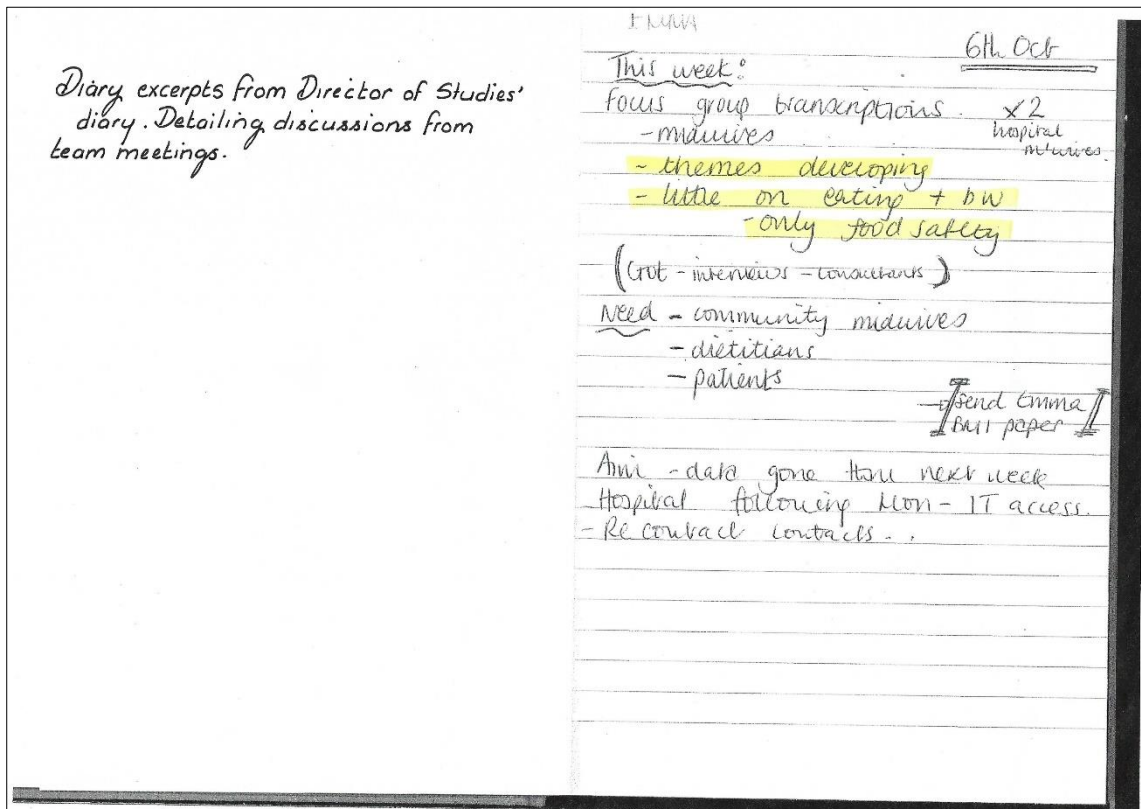
MW4

"When you come into pregnancy and you are bigger, I mean I had a BMI of 41 when I ^{was pregnant with} my daughter erm I was dreading it. I was dreading the whole antenatal process because... and also I came to it already with a history ~~menstrual history~~... it was very much the consultant said to me when I went for my 20 week scan "I'm going to tell you what I tell all women like you..." and then went on to say basically that I was too fat to scan... JUDGEMENTAL - Importance of being non-judgemental

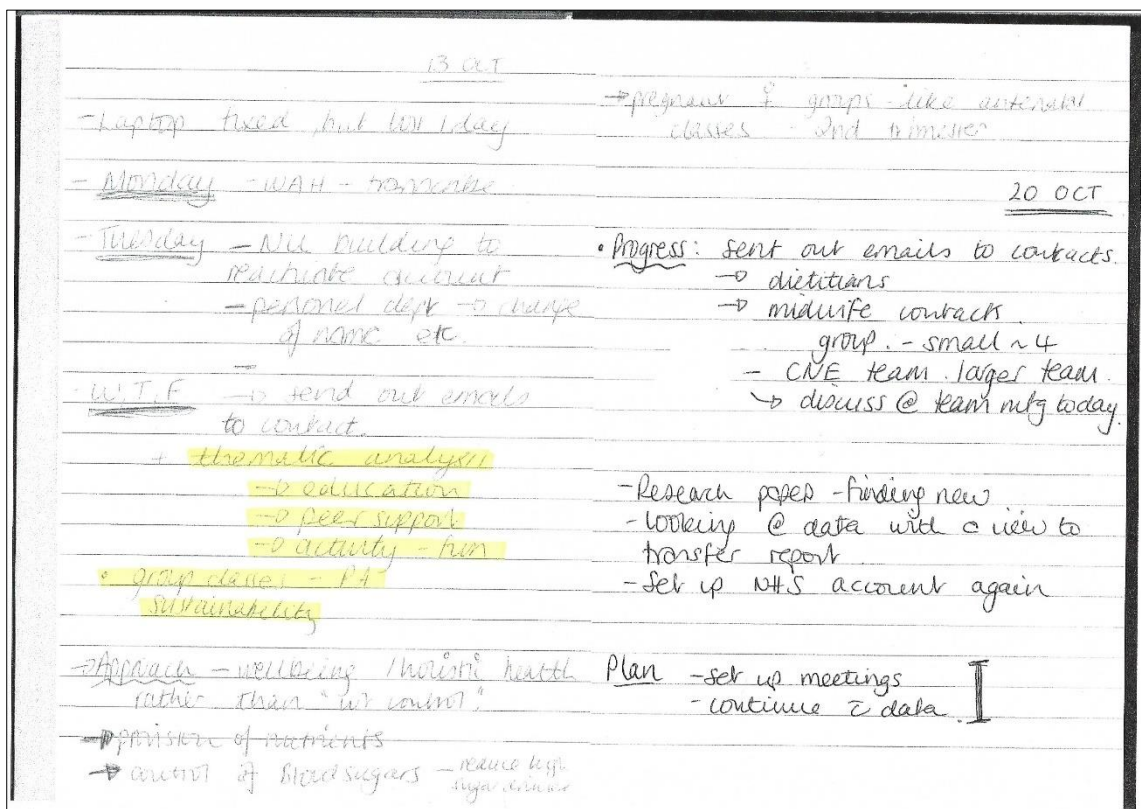
"I left that clinic wishing I had never embarked on a pregnancy - I was that upset" Judge/judgemental Importance of being non-judgemental

Appendix 18

Phase One process: Examples of theme development discussions held at research team meetings, taken from supervisor's diary



Supervisor's diary page one



Supervisor's diary page two.

26/11/12

EH, LS, GR

community m/w - new themes

women keen

→ resource

→ consistent advice lacking

→ opt out advice as in

smoking cessation.

OUTPUTS

Presented
= Nat Soc Newcastle

Ethics

report: early Jan

= Diabetes - Taunton.

= Diabetes UK abs.

= paper in prep (2)

I. Jo. Obesity. / BMC pres.

(1P) for the pack

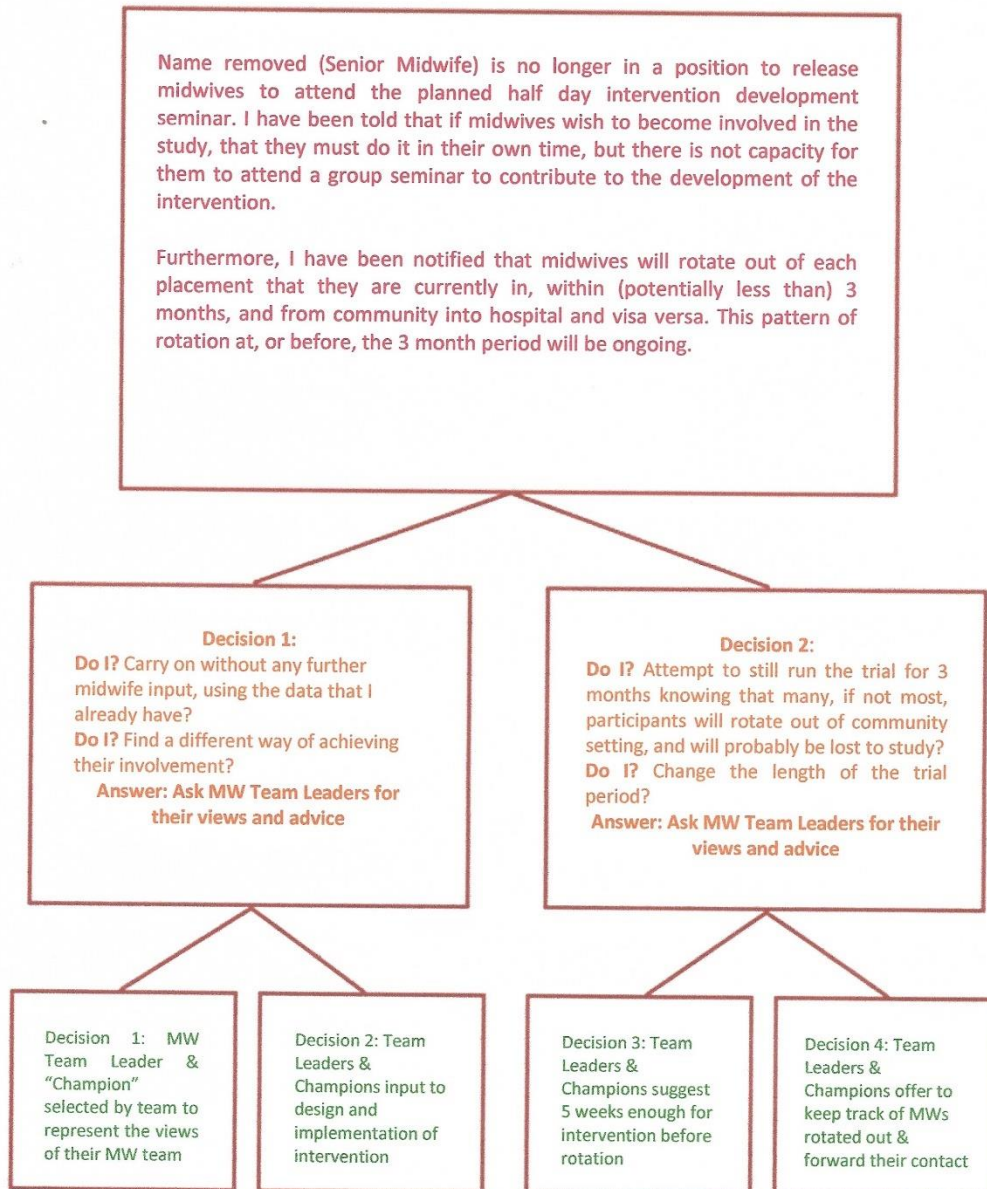
- ① Writing - chapter - new data
- plan for study
- ② 10 more patients to do

* Raising issues paper - commentary paper
for midwifery
- psy. theory use.

Appendix 19

Phase One process: Decision tree following an organisational change in midwifery service

Decision tree for the decisions required concerning the involvement of midwives in intervention design and implementation, as a result of organisational changes



Appendix 20

Phase One process: Researcher's reflective log entry, following an organisational change in midwifery service

If I give in to defeat after [redacted] negativity & just decide that I will design everything, then try and run a trial then:

1) I'll have sold my soul! and will be like all the other research. It is important that I stick to my principles in practice even if it is really difficult. Not giving in yet - this is the real NHS!

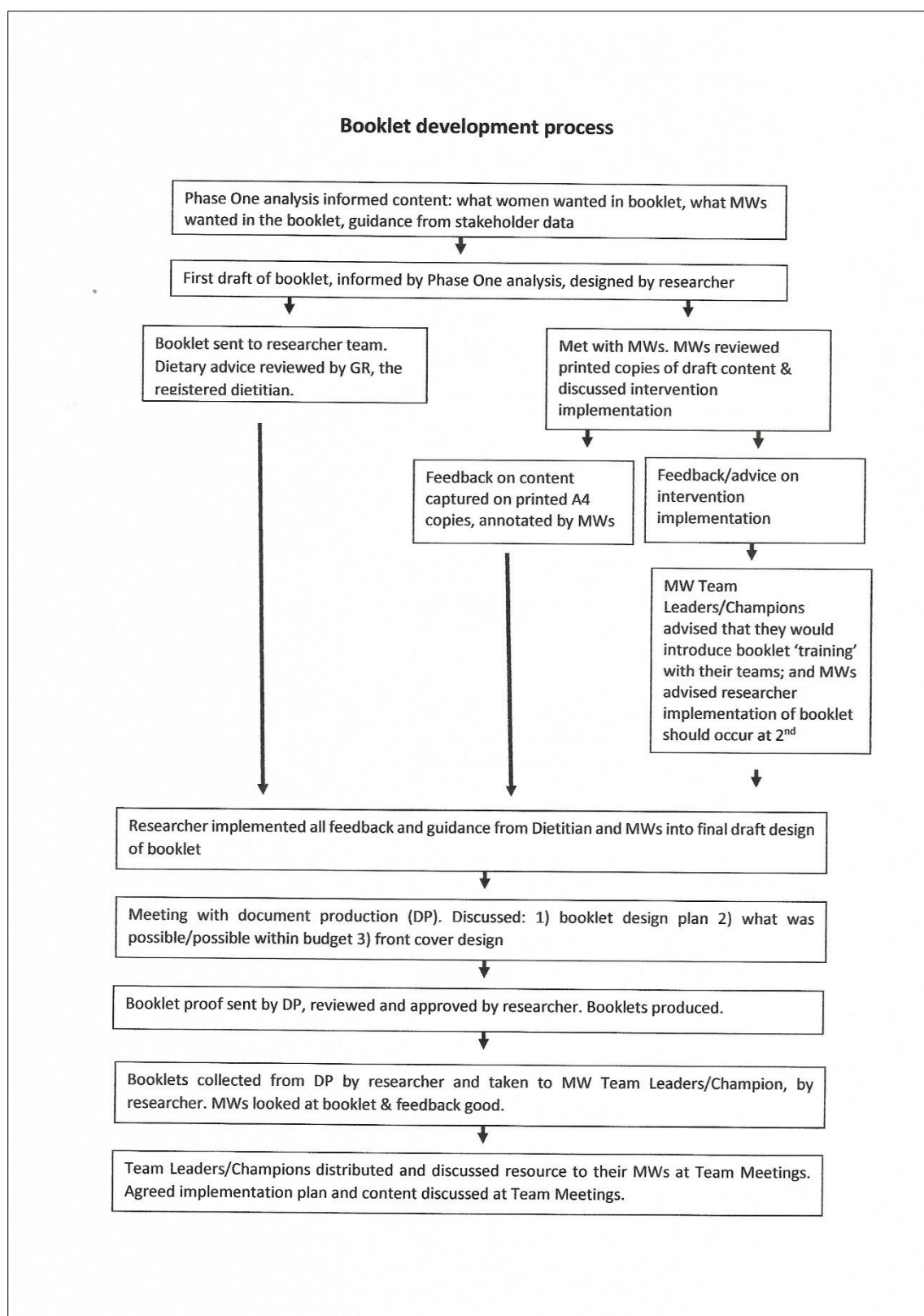
2) I will have appeared to be the "everyone else who just gives us extra things to do but no extra time to do it in" that the midwives talked about. I have some amazing MWs in my corner & not going to let them down.

3) If I make this work despite everything, it will be a coup - a strength of this work & the approach.

I have far too much personal and professional integrity to just be like everyone else because it is easier. Besides which


Appendix 21

Phase Two process: booklet development flowchart



Appendix 22

Phase Two process: Supervisor feedback on booklet content development



2. Your pregnancy diet

The types of foods that you should eat are important and will help you control your pregnancy weight gain and give you and your baby essential nutrients.

So what types of food should I eat then to control my pregnancy weight gain?

Eating the right foods for you and your baby doesn't need to be complicated. A really simple way to think about your pregnancy diet is to aim to eat as few sugars as possible. Sugars can be really obvious in sweets, chocolates and fizzy drinks, cakes and pastries or less obvious in refined carbohydrates.

So why should I reduce my sugars and refined carbohydrates?

When we eat any type of carbohydrate our bodies produce insulin to process it and then either uses it for energy or stores it (if we don't need the energy). The body can normally do this without any problems but not all carbohydrates are equal though!

If you regularly eat foods that are high in sugars such as sweet things and refined carbohydrates your body releases lots of insulin and quickly stores this food as *fat* stores, making you gain weight. Eating lots of sugars regularly can also make your insulin (the hormone that regulates the amount of glucose in your blood) less effective and increases your risk of developing *diabetes*.

The good news is that if you simply eat foods that cause a far gentler rise in blood sugar you can prevent these things from happening and it is easier to control your weight.

Drinks

It is very easy to consume additional sugars from your drinks without really noticing so swap sugary drinks and squashes with sugar free versions. Other drinks that are good for both you and your unborn baby are skimmed or semi-skimmed milk, 150ml pure fruit juice mixed with sparkling water and herbal or fruit teas.

How do you do it? Top tips!

- Base your meals on starches and make them wholegrain wherever you can (wholegrain bread, brown rice, whole wheat pasta, oats, beans, lentils)
- Eat moderate amounts of those starches; don't overdo it! (See portion plate p.4)
- Avoid obvious sugars
- Include protein in meals as often as you can. It will help you to stay fuller for longer

Commented [GR1]: I think here we need to say reduce sugar consumption but it isn't the only thing – so I think we also need to say other things. Can we put some bullet points – reduce sugar, eat more fruit and veg, eat regular meals (see portion guidance), smaller portions of fats etc – could get these bullet points from NHS

Commented [GR2]: I think need to avoid 'refined CHO' here as on one of the other pages we encourage more wholegrains. And even refined CHO in a small portion is needed if wholegrains aren't eaten.

Commented [GR3]: Ditto. You could say eat more wholegrains but at this point we haven't said which foods are which!

Commented [GR4]: ditto

Commented [GR5]: and feel hungry quicker

Commented [GR6]: The biggest contribution to this is being over weight not eating sugars perse

Commented [GR7]: And fatty foods

Supervisor feedback on booklet content page one.

- Swap sugary drinks for sugar free alternatives or mix a little fruit juice with sparkling water for a healthier fizz!
- Try different herbal and fruits teas as a swap for your usual tea and coffee

Commented [GR8]: Remove these as you have said this in the above paragraph

Supervisor feedback on booklet content page two.

2. Your pregnancy diet

So what types of food should I eat then to control my pregnancy weight gain?

Eating the right foods for you and your baby doesn't need to be complicated. A really simple way to think about your pregnancy diet is to aim to reduce sugar consumption by eating only a small amount of obvious sugars in sweets, chocolates and fizzy drinks, cakes and pastries. Sugary foods and sugary drinks contain calories without providing any other nutrients, and can contribute to weight gain, obesity and tooth decay.

Fat is very high in calories, and eating too many fatty foods is likely to make you put on weight. Having too much saturated fat can increase the amount of cholesterol in the blood, which increases the chance of developing heart disease.

- Eat plenty of fruit and vegetables because these provide vitamins and minerals, as well as fibre, which helps digestion and prevents constipation.
- Eat at least five portions of fruit and vegetables a day – these can be fresh, frozen, canned, dried or juiced. Always wash fresh fruit and vegetables carefully.
- Starchy foods are an important source of vitamins and fibre, and are satisfying without containing too many calories. They include bread, potatoes, breakfast cereals, rice, pasta, noodles, maize, millet, oats, sweet potatoes, yams, and cornmeal.
- These foods should be the main part of every meal. Eat wholemeal instead of (white) varieties when you can.
- Eat some protein every day. Below are some healthy suggestions
- Choose lean meat, remove the skin from poultry, and cook it using only a little fat.
- Make sure eggs, poultry, burgers, sausages and whole cuts of meat such as lamb, beef and pork are cooked all the way through. Check that there is no pink meat, and that juices have no pink or red in them.
- Dairy foods such as milk, cheese, fromage frais and yoghurt are important in pregnancy because they contain calcium and other nutrients that your baby needs.
- Choose low-fat varieties wherever possible. For example, semi-skimmed or skimmed milk, low-fat yoghurt and half-fat hard cheese. Choose low sugar yoghurts.
- It is very easy to consume additional sugars from your drinks without really noticing so swap sugary drinks and squashes with sugar free versions. Other drinks that are good for both you and your unborn baby are skimmed or semi-skimmed milk, 150ml pure fruit juice mixed with sparkling water and herbal or fruit teas.

Commented [GR1]: I might be inclined to leave this unless you bring it in lower down the page when you mention high sat fat foods. At this point they may not know which foods contain sat fats. Or you could put examples in brackets – again I would say (cakes, pastries, biscuits, processed meat products such as sausages, pasties and pies)

Deleted: them

Deleted: processed

Deleted:

Commented [GR3]: At each meal? –

Commented [GR4]: Need to be careful as some varieties aren't suitable. You could say camomile or mint or fruit

Supervisor feedback on booklet content page three.

Appendix 23

Phase Two process: Midwife feedback on booklet development

• Add the onion, carrot and garlic to a saucepan with the oil and sauté for a few minutes to soften.

• Add the tomato puree, stock, herbs and beans, and simmer for 10 minutes to heat through.

• This can be served chunky, by removing half, pulsing in a blender, and adding back to the pan, or smooth, by blending the lot.

The herbs can be replaced with a shake of mixed dried herbs.

Jack Monroe's chicken casserole recipe

This quick, tasty casserole improves with time, so you could make it in advance, allowing the flavours to develop. It is also delicious cold – I couldn't stop eating it from the fridge.

(Serves 4) Approximately 99p a portion

100g dried butter beans, soaked overnight
1 tbsp oil
4 chicken drumsticks/thighs
1 onion, chopped
4 cloves of garlic, thinly sliced
1 carrot, chopped
100g streaky bacon, chopped
1 tsp mixed dried herbs
1 good handful of chopped cabbage
300ml chicken stock
1 tbsp tomato puree

• Drain and rinse the beans thoroughly (make sure they have soaked for at least eight hours), then pop them in a saucepan. Cover with water and boil rapidly for 10 minutes, then reduce to a vigorous simmer.

• Add a little oil to a large saucepan on a high heat and add the chicken, skin-side down. Cook for 10 minutes, turning halfway through.

• When the chicken has browned, add the onion, garlic, carrot, bacon and herbs, and reduce the heat to medium for a further 10 minutes.

• Drain the beans and add to the pan with the artichokes, pour over the stock and stir in the puree. Bring to the boil, then reduce to a simmer and cover with a lid, plate or foil. Simmer for 20 minutes until the chicken is cooked through and the sauce has thickened.

DISCUSSION ABOUT ARTICHOKE TRIGGERED!! X4 MWS SAID THIS SHOULD BE REMOVED COMPLETELY AS NONE OF THEIR WOMEN WERE LIKELY TO BUY AN ARTICHOKE / HARD TO GET HOLD OF IN THEIR AREA / WOULDN'T KNOW WHAT IT WAS. ALTERNATIVE

Removed from final booklet design.

not on menu list

Midwife feedback on booklet development page one.

3. Easy Swaps and Top Tips for your Pregnancy Diet

- Eat breakfast even if it is only small and *swap* sugary cereals such as 'honey' or sugar coated cereals for high fibre cereals. Traditional porridge is perfect or how about scrambled egg on toast or muesli with yoghurt. You could have Weetabix or Fruit and Fibre and add fruit like banana to it.
- *Swap* white bread and rolls for granary, whole wheat tortilla wraps are good too. The seedier your bread the better. Try stuffing brown pitta bread with salad and ham/low fat cheese/egg or homous.
- Don't always choose potatoes. Try pasta and rice for a change and have moderate portions. Check the portion plate on page 4 for an idea of portion size.
- Include lean protein in as many of your meals as you can (lean meat, fish, eggs, low fat dairy, soya or quorn). Small amounts of red meat are okay too (just trim any fat off). Avoid processed meat products such as pasties, pies, sausage rolls.
- Increase the amount of vegetables you eat. Eat unlimited amounts of green, leafy vegetables, carrots, peas, beans and plain salads (no dressing).
- Eat a variety of foods. The more different things that you eat, the more likely it is that you will get your essential vitamins and minerals.
- Eat pulses (beans, peas and lentils) and yes...that includes baked beans.
- Make your snacks low sugar snacks such as a small handful of nuts and dried apricots, hummus and carrot sticks, a couple of satsumas, an apple, yoghurt.
- Swap sugary drinks for sugar free fizzy drinks and squash. You will get used to it...honestly!

Water???

↑

GOOD POINT - I MISSED THIS!
NOW ADDED TO BOOKLET DESIGN .

Version 1: 16 04 13

Midwife feedback on booklet development page two.

Appendix 24

Phase Two process: booklet development

Excerpts from researcher's reflective log – Meeting notes from meeting with midwives about booklet/intervention development

Meeting with **MIDWIVES**
Review of leaflet/booklet.

AS - cards in an envelope? - recipe cards? *

Bright & cheerful! → Make it appealing

Can there be a pull out plate. BDA portion plate to stick on a fridge door?

* DPC = Too costly with my print budget. Can do booklet format, still AS though

Lots of pictures * Agree must be cheery

Recipe's good but sooner or later Ark will have ever bought an artichoke!!!

* Barrier for some artichoke removed.

There are already places for Children's Centres for Healthy Eating classes but limited places and not widely advertised (Can book be used at classes where teams are? Ask)

MW's Ark suggest remove this

Put telephone numbers for all the children's centres on the booklet so people can find out for themselves

* Numbers of all children's centres in book.

* MWs think will get lost in booking pack - lots of info to take home at booking → They have more time at 2nd appt too.

Will get lost not read

Other screening too much to take in at once

* Format of introduction 2nd meeting with MW IF they think appropriate.

Take boxes to [redacted] when printed → MT Leaders training at meeting with whole team meeting as satellite.

Appendix 25

Phase Two process: Excerpts from researcher's reflective log about the booklet/intervention development with midwives

Reflective notes - Booklet day!!!

Guy's @ meeting [redacted] suggested that in order to work best with time & people not necessarily touching base @ centres other than first thing in the a.m., ~~so~~ they will do training with booklet @ team meetings. They can catch up with individuals who are off sick/not on shift separately.

↓
Very supportive of final booklet - "a nice thing to have"!

THOUGHTS ON THIS →

↓
The TCs ready to implement!

Although not perfect (I can't standardise how booklet/training is delivered... but maybe I couldn't anyway?)
Lucky to have their support & they are very committed to this → "Nice to be able to give someone something"

Boxes taken to all locations → Start of

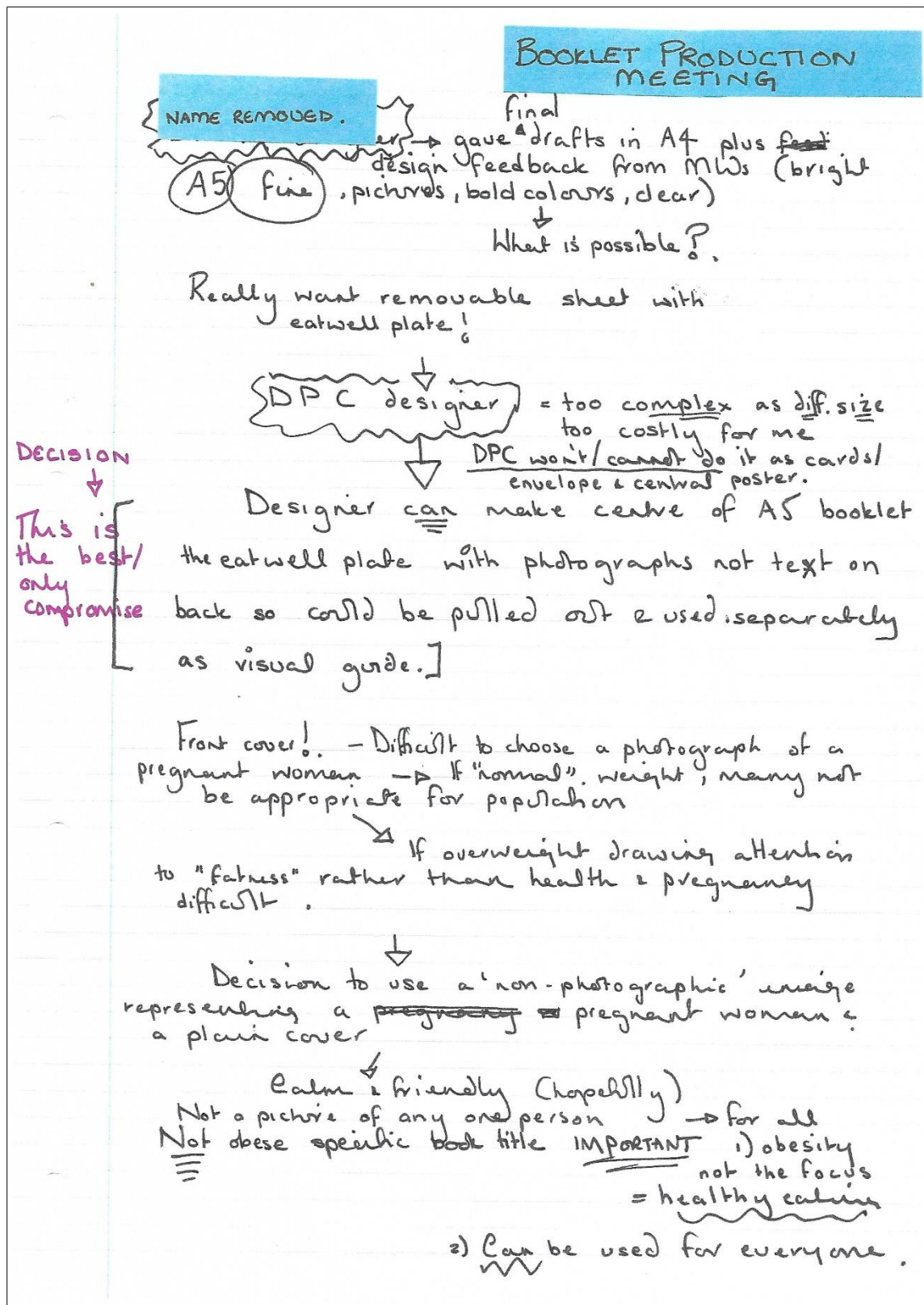
trial period [redacted] promised to help me track down NM's who rotate out. Also [redacted] is likely to go on maternity leave as getting v. tired. X 2 others threatening to take redundancy. It is out of my hands but seems likely there will be a loss of P's before too long...hey ho...

Going to keep in regular touch with all, take a biccies (& fruit) & say hello @ Centres. They are genuinely pitching for me. Loads of support!

Most reinforce however that it is totally fine for team members NOT to take part. They mustn't feel coerced by enthusiastic team leads! Voluntary, Voluntary, Voluntary!!!

Appendix 26

Phase Two process: Excerpts from researcher's reflective log – Notes on the booklet production meeting



Appendix 27
Phase Two process:
the first draft of the questionnaire before pilot trial testing



Date: _____ Participation code: _____ Years _____ of _____ midwifery practice: _____

We would like to gather your opinions and experiences about aspects of working with obese, pregnant women and controlling gestational weight gain during pregnancy. A previous study was conducted that consulted obese, pregnant women and health care professionals that care for obese, pregnant women about their views and experience of body weight and weight gain during pregnancy. The questions in this questionnaire are based on the results of that study.

A resource has been developed that will be given to community midwives in the intervention period of the study that they can share with obese, pregnant women and contains information and practical tools and advice to help them control their gestational weight gain. Your completion of **this** questionnaire forms a **pilot** that we will use the results to evaluate the questionnaire that we have developed for the intervention period. You are completing the questionnaire to help us to work out how well we are asking questions about the study. Please, therefore, answer the questionnaire fully if you can even if some of the questions sound a bit funny as this will help us work out what the final questionnaire should contain.

Please enter the date and keep a copy of your participation code that you have been given and your numbers of years as a practising midwife in the spaces above. All responses to this survey are completely anonymous. The only identifying information (the single sheet held by the researcher that has your name and allocated participation code on it) will be stored separately from the surveys in a locked room within the university and may only be accessed by the research team. This sheet allows a member of the research team to remove your data from the study at a later date should you contact us to ask us to remove your data. **Please be assured that your data will remain confidential.**
Thank you.

Note to examiners: The red table notations did not appear for participants but are for your benefit.

[Attitude scale]

My supporting obese, pregnant women with controlling their gestational weight gain using a resource for the next two months would be:

Bad : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Good

Easy : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Hard

Worthless : __ : __ : __ : __ : __ : __ : __ : Valuable

Supportive : __ : __ : __ : __ : __ : __ : __ : Critical

Harmful : __ : __ : __ : __ : __ : __ : __ : Beneficial

Simple : __ : __ : __ : __ : __ : __ : __ : Complex

[Behavioural Beliefs]

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will be received negatively by obese, pregnant women and/or their partners

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not increase my knowledge around controlling gestational weight gain in obese, pregnant women

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of obese, pregnant women controlling their gestational weight gain *early* in their pregnancy

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of engaging obese, pregnant women with controlling their gestational weight gain

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to share information that outlines relative risks to health and potential pregnancy complications with obese, pregnant women

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to take action *regularly* to support controlling gestational weight gain in obese, pregnant women in the future

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will de-personalise my decision to offer support to obese, pregnant women with managing their gestational weight gain

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to use the pregnancy as a trigger point to offer support

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to encourage healthier eating in obese, pregnant women

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to give helpful guidelines about a good diet for weight management in pregnancy

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to give some meal ideas for weight management in pregnancy

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help to reinforce my consultation advice to obese, pregnant women when they are at home

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

[Outcome Expectations]

A negative reaction to supporting obese, pregnant women with controlling gestational weight gain using a resource is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**Not increasing my knowledge about supporting obese, pregnant women
with controlling their gestational weight gain is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**Obese, pregnant women controlling their gestational weight gain early in
their pregnancy is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**My engaging obese, pregnant women with controlling their gestational
weight gain is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**Not sharing information about the relative health risks and potential
pregnancy complications with obese, pregnant women is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**Not acting *regularly* in the future to support obese, pregnant women with
controlling their gestational weight gain is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**De-personalising the decision to offer support to obese, pregnant women
with managing their gestational weight gain is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Encouraging healthier eating in obese, pregnant women is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Not using pregnancy as a trigger point to offer support is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**Not giving obese, pregnant women helpful guidelines about a good diet for
weight management in pregnancy is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**Giving obese, pregnant women helpful guidelines about some meal ideas
for weight management in pregnancy is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

**Reinforcing my consultation advice to obese, pregnant women when they
are at home is**

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

[Normative Beliefs]

The National Institute for Health Care Excellence think:

I should: __ : __ : __ : __ : __ : __ : __ : I should not

**use a resource to support obese, pregnant women with controlling
gestational weight gain in the next two months**

The NHS maternity service thinks:

I should: __ : __ : __ : __ : __ : __ : __ : I should not

**use a resource to support obese, pregnant women with controlling
gestational weight gain in the next two months**

The Nursing and Midwifery Council think that:

I should: __ : __ : __ : __ : __ : __ : __ : I should not

**use a resource to support obese, pregnant women with controlling
gestational weight gain in the next two months**

My line manager thinks:

I should: __ : __ : __ : __ : __ : __ : __ : I should not

**use a resource to support obese, pregnant women with controlling
gestational weight gain in the next two months**

My colleagues think:

I should: __ : __ : __ : __ : __ : __ : __ : I should not

**use a resource to support obese, pregnant women with controlling
gestational weight gain in the next two months**

Obese, pregnant women in my care think:

I should: __ : __ : __ : __ : __ : __ : __ : I should not

**use a resource to support obese, pregnant women with controlling
gestational weight gain in the next two months**

[Motivation to Comply]

**Generally speaking, how much do you want to do what the National
Institute for Healthcare Excellence thinks you should do?**

Not at all: __ : __ : __ : __ : __ : __ : __ : Very much

**Generally speaking, how much do you want to do what the NHS maternity
thinks you should do?**

Not at all: __ : __ : __ : __ : __ : __ : __ : Very much

**Generally speaking, how much do you want to do what the Nursing and
Midwifery Council thinks you should do?**

Not at all: __ : __ : __ : __ : __ : __ : __ : Very much

**Generally speaking, how much do you want to do what your line manager
thinks you should do?**

Not at all: __ : __ : __ : __ : __ : __ : __ : Very much

**Generally speaking, how much do you want to do what your colleagues
think you should do?**

Not at all: __ : __ : __ : __ : __ : __ : __ : Very much

**Generally speaking, how much do you want to do what obese, pregnant
women in your care think you should do?**

Not at all: __ : __ : __ : __ : __ : __ : __ : Very much

[Control Beliefs]

**I expect that I will be able to offer a supportive resource about controlling
gestational weight gain to obese, pregnant women in the next two months**

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

**I expect that I will not increase my knowledge base about controlling
gestational weight gain in obese, pregnant women in the next two months**

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

**I expect that I will be able to engage obese, pregnant women with
controlling their gestational weight gain *early* in their pregnancy, in the
next two months**

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

I expect that I will not share information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy with obese, pregnant women in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

I expect that I will always feel able to give weight management advice for controlling gestational weight gain to obese, pregnant women in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

[Power of Control Factors]

Offering a supportive resource to obese, pregnant women would enable me to support them with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : Completely disagree

Not increasing my knowledge base about controlling gestational weight gain would enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : Completely disagree

Engaging obese, pregnant women with controlling gestational weight gain *early* in their pregnancy would enable me to support them to control their gestational weight gain, during the next two months

Completely agree : __ : __ : __ : __ : __ : __ : __ : Completely disagree

Not sharing information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy would enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : __ : Completely disagree

Always giving weight management advice for controlling gestational weight gain to all obese, pregnant women would de-personalising the decision and enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : __ : Completely disagree

[Intention]

I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months

I will definitely offer support: __ : __ : __ : __ : __ : __ : __ : I will definitely not
offer support

[Actual, self-reported, Behaviour]

I currently offer obese, pregnant women support with controlling their gestational weight gain using a resource

Always: __ : __ : __ : __ : __ : __ : __ : Never

[Self-Efficacy]

If someone opposes me I can find means and ways to get what I want

Not at all true: ___ : ___ : ___ : ___ : Exactly true

It is easy for me to stick to my aims and accomplish my goals

Not at all true: ___ : ___ : ___ : ___ : Exactly true

I am confident that I could deal efficiently with unexpected events

Not at all true: ___ : ___ : ___ : ___ : Exactly true

**Thanks to my resourcefulness, I know how to handle unforeseen
situations**

Not at all true: ___ : ___ : ___ : ___ : Exactly true

**I can remain calm when facing difficulties because I can rely on my coping
abilities**

Not at all true: ___ : ___ : ___ : ___ : Exactly true

No matter what comes my way, I'm usually able to handle it:

Not at all true: ___ : ___ : ___ : ___ : Exactly true

Appendix 28

Phase Two process: Researcher's notes. Analyses followed by a narrative of the process of scale analyses and decision making in the pilot trial

Scale development and item-total correlations/alpha if item removed

Reliability analysis: Scale Alpha; Scale Item Corrected Total; Scale Alpha if Item Deleted.

Item-Total Statistics					
ATTITUDE SCALE					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
My supporting obese, pregnant women with controlling their gestational weight gain using a resource for the next two months would be bad/good	-3.63	19.411	.818	.923	.727
My supporting obese, pregnant women with controlling their gestational weight gain using a resource for the next two months would be easy/hard	-5.25	31.071	-.138	.739	.889
My supporting obese, pregnant women with controlling their gestational weight gain using a resource for the next two months would be worthless/valuable	-3.63	19.125	.850	.973	.719
My supporting obese, pregnant women with controlling their gestational weight gain using a resource for the next two months would be supportive/critical	-4.50	22.000	.654	.562	.769
My supporting obese, pregnant women with controlling their gestational weight gain using a resource for the next two months would be harmful/beneficial	-3.25	22.500	.676	.943	.768
My supporting obese, pregnant women with controlling their gestational weight gain using a resource for the next two months would be simple/complex	-6.00	17.714	.658	.655	.774

Remove

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
-5.25	30.500	5.523	6

RELIABILITY

```

/VARIABLES=BBNEG BBKNOW BBEARLY BBENGAGE BBRISK BBREGULA BBDEPERS BBTRIGG BBHEALTH BBGUIDE
MEAL BBHOME
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA
/STATISTICS=DESCRIPTIVE SCALE CORR
/SUMMARY=TOTAL MEANS.

```

Reliability

[DataSet1] C:\Users\elhazeldine\SPSS PILOT RUN 2.RECODED AND RAW DATA.sav

Item-Total Statistics

BEHAVIORAL BELIEFS

782-

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will be received negatively by obese, pregnant women and/or their partners	-9.60	68.711	.565		.750
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not increase my knowledge around controlling gestational weight gain in obese, pregnant women	-9.20	63.733	.755		.723
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of obese, pregnant women controlling their gestational weight gain early in their pregnancy	-9.50	83.389	.119		.796
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of engaging obese, pregnant women with controlling their gestational weight gain	-8.90	73.878	.571		.753
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to share information that outlines relative risks to health and potential pregnancy complications with obese, pre	-9.20	70.178	.670		.740

Removed
O.E. poor.

Remove

Item-Total Statistics

BEHAVIOURAL BELIEFS

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to take action regularly to support controlling gestational weight gain in obese, pregnant women in the future	-9.70	71.567	.485		.760
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will de-personalise my decision to offer support to obese, pregnant women with managing their gestational weight gain	-11.30	91.789	-.202		.818
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to use the pregnancy as a trigger point to offer support	-8.70	74.678	.516		.758
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to encourage healthier eating in obese, pregnant women	-8.80	79.733	.268		.782
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to give helpful guidelines about a good diet for weight management in pregnancy	-8.60	75.600	.564		.756

Remove

Remove as
OE ~~Item~~ Pool.

Item-Total Statistics

BEHAVIOURAL BELIEFS

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to give some meal ideas for weight management in pregnancy	-8.80	83.067	.320		.777
My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help to reinforce my consultation advice to obese, pregnant women when they are at home	-8.80	74.178	.441		.765

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
-10.10	88.544	9.410	12

RELIABILITY

```

/VARIABLES=OENEG OEKNOW OEEARLY OEENGAGE OERISK OEREGULA OEDEPERS OEHEALTH OETRIGG OEGUIDE
MEAL OEHOME
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA
/STATISTICS=DESCRIPTIVE SCALE CORR
/SUMMARY=TOTAL MEANS.

```

Reliability

[DataSet1] C:\Users\elhazeldine\SPSS PILOT RUN 2.RECODED AND RAW DATA.sav

Warnings

The determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values.

Scale: ALL VARIABLES

Case Processing Summary

	N	%
Cases Valid	10	100.0
Excluded ^a	0	.0
Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Item-Total Statistics

OUTCOME EXPECTATIONS

0.440

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
A negative reaction to supporting obese, pregnant women with controlling gestational weight gain using a resource is	-19.50	31.833	-.079		.471
Not increasing my knowledge about supporting obese, pregnant women with controlling their gestational weight gain is	-18.50	26.500	.629		.335
Obese, pregnant women controlling their gestational weight gain early in their pregnancy is	-17.90	28.100	.430		.377
My engaging obese, pregnant women with controlling their gestational weight gain is	-18.20	22.400	.617		.253
Not sharing information about the relative health risks and potential pregnancy complications with obese, pregnant women is	-18.10	30.100	.281		.415
Not acting regularly in the future to support obese, pregnant women with controlling their gestational weight gain is	-19.50	24.722	.199		.408
De-personalising the decision to offer support to obese, pregnant women with managing their gestational weight gain is	-20.20	39.733	-.473		.684
Encouraging healthier eating in obese, pregnant women is	-18.50	26.722	.087		.460
Not using pregnancy as a trigger point to offer support is	-19.00	25.111	.361		.348
Not giving obese, pregnant women helpful guidelines about a good diet for weight management in pregnancy is	-18.50	27.389	.400		.369
Giving obese, pregnant women helpful guidelines about some meal ideas for weight management in pregnancy is	-18.10	28.989	.243		.406
Reinforcing my consultation advice to obese, pregnant women when they are at home is	-18.40	25.600	.479		.332

Must be removed

Item-Total Statistics

NORMATIVE BELIEFS

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Reinforcing my consultation advice to obese, pregnant women when they are at home is	-7.33	34.000	.652	.830	.899
The National Institute for Health Care Excellence think /use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months	-8.11	32.111	.674	.988	.898
The NHS maternity service thinks/use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months	-7.78	34.194	.626	.807	.902
The Nursing and Midwifery Council think that/use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months	-7.67	34.250	.863	.931	.884
My line manager thinks/use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months	-8.33	30.500	.869	.992	.874
My colleagues think/use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months	-8.56	33.528	.713	.842	.893
Obese, pregnant women in my care think/use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months	-8.22	29.944	.735	.895	.893

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
-9.33	43.750	6.614	7

RELIABILITY

```

/VARIABLES=MCNIHCE MCMAT MCNMC MCLINE MCCOLL MCOPW
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA
/STATISTICS=DESCRIPTIVE SCALE CORR
/SUMMARY=TOTAL MEANS.

```

Reliability

[DataSet1] C:\Users\elhazeldine\SPSS PILOT RUN 2.RECODED AND RAW DATA.sav

MOTIVATION TO COMPLY .

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Generally speaking, how much do you want to do what the National Institute for Healthcare Excellence thinks you should do?	-8.20	23.956	.843		.900
Generally speaking, how much do you want to do what the NHS maternity thinks you should do?	-8.50	21.611	.897		.888
Generally speaking, how much do you want to do what the Nursing and Midwifery Council thinks you should do?	-8.20	23.956	.843		.900
Generally speaking, how much do you want to do what your line manager thinks you should do?	-8.70	22.011	.834		.897
Generally speaking, how much do you want to do what your colleagues think you should do?	-8.30	27.122	.519		.935
Generally speaking, how much do you want to do what obese, pregnant women in your care think you should do?	-9.10	19.433	.809		.911

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
-10.20	32.622	5.712	6

RELIABILITY

```

/VARIABLES=PBCOFFER PBCKNOW PBCEARLY PBCRISK PBCADVIC
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA
/STATISTICS=DESCRIPTIVE SCALE CORR
/SUMMARY=TOTAL MEANS.

```

Reliability

[DataSet1] C:\Users\elhazeldine\SPSS PILOT RUN 2.RECODED AND RAW DATA.sav

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	9	90.0
	Excluded ^a	1	10.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Summary Item Statistics

CONTROL BELIEFS.

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	-1.575	-2.250	-1.000	1.250	.444	.200	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Offering a supportive resource to obese, pregnant women would enable me to support them with controlling their gestational weight gain in the next two months	-5.63	24.839	.274	.119	.905
Not increasing my knowledge base about controlling gestational weight gain would enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months	-6.25	17.071	.790	.808	.803
Engaging obese, pregnant women with controlling gestational weight gain early in their pregnancy would enable me to support them to control their gestational weight gain, during the next two months	-6.38	13.982	.893	.939	.770
Not sharing information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy would enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months	-6.38	15.982	.914	.958	.769
Always giving weight management advice for controlling gestational weight gain to all obese, pregnant women would de-personalising the decision and enable me to support obese, pregnant women with controlling their gestational weight gain in the next two m	-6.88	18.411	.565	.452	.864

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
-7.88	27.268	5.222	5

CORRELATIONS

```

/VARIABLES=BBTOTAL ATTTOTAL
/PRINT=TWOTAIL NOSIG
/MISSING=PAIRWISE.

```

Item-Total Statistics

POWER OF CONTROL FACTORS .

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I expect that I will be able to offer a supportive resource about controlling gestational weight gain to obese, pregnant women in the next two months	-5.00	23.500	.416	.945	.742
I expect that I will not increase my knowledge base about controlling gestational weight gain in obese, pregnant women in the next two months	-4.00	20.750	.799	.939	.632
I expect that I will be able to engage obese, pregnant women with controlling their gestational weight gain early in their pregnancy, in the next two months	-4.33	17.000	.801	.888	.588
I expect that I will not share information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy with obese, pregnant women in the next two months	-4.33	24.750	.187	.790	.835
I expect that I will always feel able to give weight management advice for controlling gestational weight gain to obese, pregnant women in the next two months	-4.56	20.278	.552	.906	.696

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
-5.56	31.278	5.593	5

RELIABILITY

```

/VARIABLES=PCFOFFER PCFKNOW PCFEARLY PCFRISK PCFADVIC
/SCALE('ALL VARIABLES') ALL
/MODEL=ALPHA
/STATISTICS=DESCRIPTIVE SCALE CORR
/SUMMARY=TOTAL MEANS.

```

Reliability

[DataSet1] C:\Users\elhazeldine\SPSS PILOT RUN 2.RECODED AND RAW DATA.sav

Scale: ALL VARIABLES

This is a narrative of the process of scale analyses and decision making

Attitude scale

Scale alpha 0.777

Corrected item-total <0.5: “My supporting obese, pregnant women with controlling gestational weight gain would be **easy/hard**” with a corrected item-total of **-0.159**

All other corrected item totals are >0.5

Scale alpha increases if item deleted for “My supporting obese, pregnant women with controlling gestational weight gain would be **easy/hard**”. Scale if item removed **0.866**.

Decision therefore to remove this single item from final scale.

Behavioural Belief and Outcome Expectation Scales

Behavioural belief scale

Scale alpha 0.779

Below, items considered initially to remove from the scale. These items had very low corrected item totals plus the scale was improved if each of these items was deleted.

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of obese, pregnant women controlling their gestational weight gain early in their pregnancy” **Corrected item total 0.166 | Scale if item deleted 0.791**

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to encourage healthier eating in obese, pregnant women” **Corrected item total 0.199 | Scale if item deleted 0.785**

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will de-personalise my decision to offer support to obese, pregnant women with managing their gestational weight gain” **Corrected item total -0.24 | Scale if item deleted 0.799**

Below, items more complex to make decisions about removing from the scale. These items had < 0.5 corrected item totals but were not necessarily very low plus the scale alpha reduced if each of these items was deleted.

That said, the scale alpha if each of these items was deleted individually remained at >0.7.

Decisions, therefore, were suspended until the data for the corresponding outcome expectation was examined and considered.

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to give helpful guidelines about a good diet for weight management in pregnancy” Corrected item-total 0.497 | Scale if item deleted 0.759

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to take action regularly to support controlling gestational weight gain in obese, pregnant women in the future” Corrected item-total 0.493 | Scale if item deleted 0.756

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to use the pregnancy as a trigger point to offer support” Corrected item-total 0.444 | Scale if item deleted 0.762

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to give some meal ideas for weight management in pregnancy” Corrected item-total 0.380 | Scale if item deleted 0.770

“My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help to reinforce my consultation advice to obese, pregnant women when they are at home” Corrected item-total 0.413 | Scale if item deleted 0.765

These items are for review in light of the outcome expectation analysis.

Outcome expectation

Scale alpha 0.514

Below, items considered initially to remove from the scale. These items had very low corrected item totals plus the scale was improved if each of these items was deleted.

“De-personalising the decision to offer support to obese, pregnant women with managing their gestational weight gain” Corrected item-total -0.383 | Scale if item deleted 0.720 (*Note scale if this item is deleted is notably improved*)

“Not acting regularly in the future to support obese, pregnant women with controlling their gestational weight gain is” Corrected item-total -0.68 | Scale if item deleted 0.611 (*Note scale if this item is deleted is notably improved*)

“A negative reaction to supporting obese, pregnant women with controlling gestational weight gain with a resource is” **Corrected item-total -0.45 | Scale if item deleted 0.537**

“Not sharing information about the relative health risks and potential pregnancy complications with obese, pregnant women is” **Corrected item-total 0.28 | Scale if item deleted 0.519**

Below, items more complex to make decisions about removing from the scale. These items had < 0.5 corrected item totals but were not all necessarily very low plus the scale alpha reduced if each of these items was deleted.

Decisions, therefore, were reviewed alongside the data for the corresponding behavioural belief.

“Not using pregnancy as a trigger point to offer support is” **Corrected item-total 0.490| Scale if item deleted 0.395**

“Giving obese, pregnant women helpful guidelines about some meal ideas for weight management in pregnancy is” **Corrected item-total 0.233| Scale if item deleted 0.488**

“Reinforcing my consultation advice to obese, pregnant women when they are at home is” **Corrected item-total 0.383| Scale if item deleted 0.443**

These items are for review in light of the outcome expectation analysis.

Decisions regarding behavioural belief scale items and associated outcome expectation items

Behavioural belief removal of:

1. “My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of obese, pregnant women controlling their gestational weight gain early in their pregnancy”
2. “My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to encourage healthier eating in obese, pregnant women”
3. “My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will de-personalise my decision to offer support to obese, pregnant women with managing their gestational weight gain”

Reason: Poor corrected item-totals and scale is improved by the removal of the items.

4. "My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to take action regularly to support controlling gestational weight gain in obese, pregnant women in the future"
5. "My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to share information that outlines relative risks to health and potential pregnancy complications with obese, pregnant women"
6. "My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will be received negatively by obese, pregnant women and/or their partners"

Reason: These items must be removed from the associated outcome expectation scale and therefore need to be removed from this scale.

Behavioural belief: questionable items retained

"My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to use the pregnancy as a trigger point to offer support"

Reason: This item and associated outcome expectation item are both over 0.4 corrected item totals and on both behavioural belief scale and outcome expectation scale the scale alphas are reduced by removal of this item (and its OE partner).

"My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to give helpful guidelines about a good diet for weight management in pregnancy"

Reason: This item is nearly 0.5 corrected item total and its partner on the OE scale exceeds the 0.5 thresholds. Both in the BB scale and partner OE scale have alpha reduced by removal of the item (and partner item)

"My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to give some meal ideas for weight management in pregnancy"

"My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help to reinforce my consultation advice to obese, pregnant women when they are at home"

Reason: Although these items do not have very strong corrected item totals, the scale alpha is reduced by the removal of each of these items. Additionally the partner items on the OE scale whilst also not achieving a corrected item-total of 0.5 experience a notable, significant reduction in

scale alpha when the items are deleted. NB: This is a decision that I am least sure about!

Outcome expectation: removal of

1. "De-personalising the decision to offer support to obese, pregnant women with managing their gestational weight gain"
2. "Not acting regularly in the future to support obese, pregnant women with controlling their gestational weight gain is"
3. "A negative reaction to supporting obese, pregnant women with controlling gestational weight gain with a resource is"
4. "Not sharing information about the relative health risks and potential pregnancy complications with obese, pregnant women is"

Reason: Poor corrected item totals and scale is improved by the removal of the items.

5. "Obese, pregnant women controlling their gestational weight gain early in their pregnancy is"
6. "Encouraging healthier eating in obese, pregnant women is"

Reason: Reason: These items must be removed from the associated behavioural belief scale and therefore need to be removed from this scale.

Outcome expectation: questionable items retained

"Giving obese, pregnant women helpful guidelines about some meal ideas for weight management in pregnancy is"

"Reinforcing my consultation advice to obese, pregnant women when they are at home is"

**Reason: Although these items do not have very strong corrected item totals, the scale alpha is reduced by the removal of each of these items.
NB: This is the decision I am least sure about.**

Summary of amendments to the behavioural belief a and outcome expectation scales

A total of six items has been removed from each of these scales leaving a total of six items retained in each of the scales.

Normative Belief Scale and Motivation to Comply Scale

I think that both the normative belief scale and motivation to comply scale should remain as they appear in the pilot. With just one exception in each, both scales contained items with strong corrected item totals much above 0.5 and both scale alphas were reduced by the removal of items.

Normative belief scale

Scale alpha: 0.907

“The NHS maternity service thinks/use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months”
corrected item-total 0.554 | scale if item deleted 0.916

Motivation to comply scale

Scale alpha 0.928

“Generally speaking, how much do you want to do what obese, pregnant women in your care think you should do?” **corrected item-total 0.497| scale if item deleted 0.955**

Summary of amendments to the normative belief and motivation to comply scales

No amendments have been made. Although in the normative belief scale, the scale alpha if item is deleted is slightly improved, the item total is good; the partner item in the MC scale is also strong and the overall scale alpha is excellent. In the motivation to comply scale, the scale alpha if item is deleted is improved and the item total is just under 0.5 however the partner item on the NB scale is strong and the overall scale alpha is excellent therefore no amendments to these scales will be made.

Perceived Behavioural Control Scale and Power of Control Factors Scale

Perceived behavioural control scale

Scale alpha 0.738

"I expect that I will be able to offer a supportive resource about controlling gestational weight gain to obese, pregnant women in the next two months" **corrected item-total 0.485 | scale if item deleted 0.699**

"I expect that I will not share information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy with obese, pregnant women in the next two months" **corrected item-total 0.113 | scale if item deleted 0.842**

Power of control factors scale

Scale alpha 0.861

"Offering a supportive resource to obese, pregnant women would enable me to support them with controlling their gestational weight gain in the next two months" **corrected item-total 0.274 | scale if item deleted 0.905**

"Always giving weight management advice for controlling gestational weight gain to all obese, pregnant women would de-personalising the decision and enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months" **corrected item-total 0.565 | scale if item deleted 0.864**

Decisions regarding the perceived behaviour control scale

"I expect that I will be able to offer a supportive resource about controlling gestational weight gain to obese, pregnant women in the next two months"

Item removal- Reason: Although the corrected item-total is near 0.5 and scale alpha is decreased if the item is deleted; the item total is < 0.5 and the partner item in the PCF scale has poor item total/significant increase in scale alpha if the item is deleted therefore has been removed from the PCF scale. The associated item, therefore, must be removed from this scale??? Query this see below*

*** Alternatively as the scale alpha in the PCF scale is excellent anyway there is a case for retaining this item in both scales since the PERCEIVED BEHAVIOURAL CONTROL scale alpha is reduced by the removal of this item and has a fairly good item total anyway. Not sure...need to discuss.**

"I expect that I will not share information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy with obese, pregnant women in the next two months"

Item removed- Reason: Poorly correlated item total and scale alpha quite increased by removal of the item.

Decisions regarding the power of control factors

“Offering a supportive resource to obese, pregnant women would enable me to support them with controlling their gestational weight gain in the next two months”

Query: See above

“Not sharing information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy would enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months”

Removed- Reason: The associated item was removed from the PERCEIVED BEHAVIOURAL CONTROL scale

“Always giving weight management advice for controlling gestational weight gain to all obese, pregnant women would de-personalising the decision and enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months”

Retained- Reason: Item-total >0.5 and very little increase to scale alpha if item deleted (0.03 increase). Associated PERCEIVED BEHAVIOURAL CONTROL item good.

Summary of amendments to perceived behavioural control scale and power of control factors scale

There is a query on a decision whether to remove one item discussed from each scale that is “I expect that I will be able to offer a supportive resource about controlling gestational weight gain to obese, pregnant women in the next two months (PERCEIVED BEHAVIOURAL CONTROL)/ “Offering a supportive resource to obese, pregnant women would enable me to support them with controlling their gestational weight gain in the next two months (PCF)”

One item has been removed from each scale.

Pending further discussion these are now 5 item scales.

Where the scale is now

Pending one final decision the final scale is now ready for use in the main study and consists of a five-item attitude scale; six item behavioural belief and outcome expectation scales; six item normative belief and motivation to comply scales; five item perceived behavioural control and power of control factor scales; plus the additional three stage of change items (not tested); six item SES (not tested) and intention and actual behaviour item.

Appendix 29
Phase Two process:
Pilot trial of the Questionnaire
Exploratory Analyses and Assumption Testing

Correlations between theoretical constructs and their direct measures

Correlation BB x Attitude (Behavioural Belief x Outcome Expectation)

Correlations

		Total of behavioural belief scale	Total of attitude scale
Total of behavioural belief scale	Pearson Correlation	1	-.885**
	Sig. (2-tailed)		.001
	N	10	10
Total of attitude scale	Pearson Correlation	-.885**	1
	Sig. (2-tailed)	.001	
	N	10	10

** . Correlation is significant at the 0.01 level (2-tailed).

Correlation NB x Subjective Norm

Correlations

		Total of normative belief scale	Total of subjective norm scale
Total of normative belief scale	Pearson Correlation	1	-.917**
	Sig. (2-tailed)		.000
	N	10	10
Total of subjective norm scale	Pearson Correlation	-.917**	1
	Sig. (2-tailed)	.000	
	N	10	10

** . Correlation is significant at the 0.01 level (2-tailed).

Correlation between CB x Perceived Behavioural Control

Correlations

		Total of control belief scale	Total of perceived behavioural control scale
Total of control belief scale	Pearson Correlation	1	-.619
	Sig. (2-tailed)		.056
	N	10	10
Total of perceived behavioural control scale	Pearson Correlation	-.619	1
	Sig. (2-tailed)	.056	
	N	10	10

MLR TPB x Intention

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.717 ^a	.514	.271	.922	2.503

a. Predictors: (Constant), PBC_SUM, SUBNORM_SUM, ATT_SUM

b. Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months

Coefficients-Tolerance Statistics

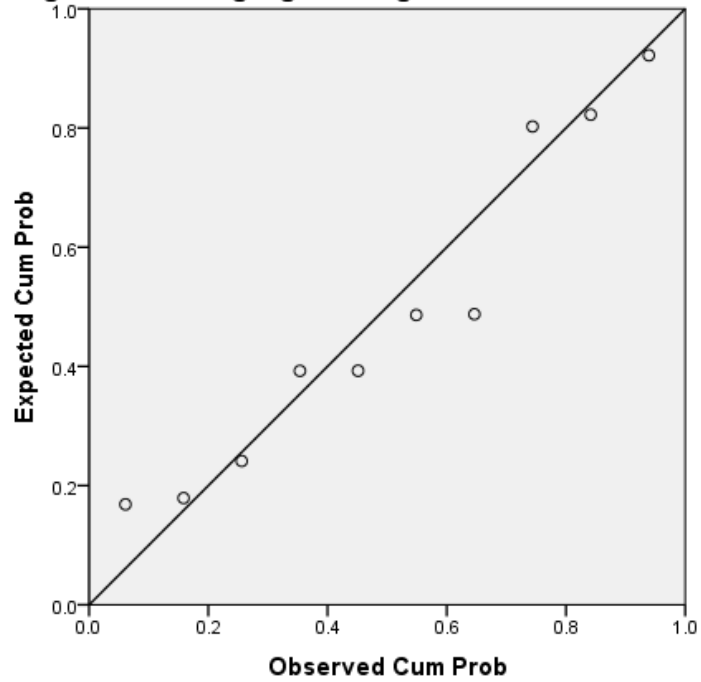
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-.756	.474		-1.593	.162	-1.916	.405					
	ATT_SUM	-.002	.017	-.039	-.109	.917	-.044	.040	-.466	-.044	-.031	.618	1.619
	SUBNORM_SUM	-.008	.023	-.130	-.368	.726	-.065	.048	-.497	-.148	-.105	.650	1.539
	PBC_SUM	-.046	.030	-.610	-1.560	.170	-.119	.026	-.708	-.537	-.444	.530	1.887

a. Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months

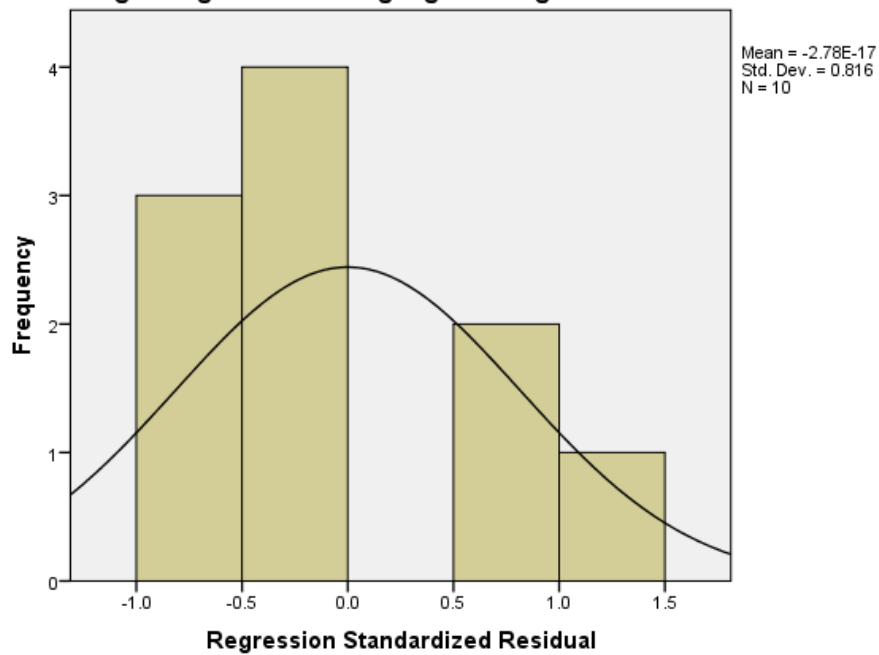
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



Histogram

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



Appendix 30
Phase Two process:
Midwife feedback on completing pilot questionnaire

- Ⓡ My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will be received negatively by obese, pregnant women and/or their partners

Extremely likely : ☐ : ☐ : ☐ : ☐ : ☐ : ☒ : Extremely unlikely

- Ⓡ My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not increase my knowledge around controlling gestational weight gain in obese, pregnant women

Extremely likely : ☐ : ☐ : ☐ : ☐ : ☐ : ☒ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of obese, pregnant women controlling their gestational weight gain *early* in their pregnancy

Extremely likely : ☒ : ☐ : ☒ : ☐ : ☐ : ☐ : Extremely unlikely

How early 15w?

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of engaging obese, pregnant women with controlling their gestational weight gain

Extremely likely : ☒ : ☐ : ☐ : ☐ : ☐ : ☐ : Extremely unlikely

- Ⓡ My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to share information that outlines relative risks to health and potential pregnancy complications with obese, pregnant women

Extremely likely : ☐ : ☐ : ☐ : ☐ : ☐ : ☒ : Extremely unlikely

- Ⓡ My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to take action *regularly* to support controlling gestational weight gain in obese, pregnant women in the future

Extremely likely : ☐ : ☐ : ☐ : ☐ : ☐ : ☒ : Extremely unlikely

I am confident that I could deal efficiently with unexpected events

Not at all true: __ : __ : ☒ : __ : Exactly true

1-3-2

Thanks to my resourcefulness, I know how to handle unforeseen situations

Not at all true: __ : ☒ : __ : __ : Exactly true

I can remain calm when facing difficulties because I can rely on my coping abilities

Not at all true: __ : __ : ☒ : __ : Exactly true

2-3-1-0-3-2

No matter what comes my way, I'm usually able to handle it:

Not at all true: __ : ☒ : __ : __ : Exactly true

I think it is very difficult to comment on the potential impact of a resource without seeing how the resource would look.

This took me 20 mins to complete.

Appendix 31
Phase Two process:
Midwife feedback on time taken to complete the pilot questionnaire

I am confident that I could deal efficiently with unexpected events

Not at all true: ☐ : ☐ : ☐ : ☒ Exactly true

Thanks to my resourcefulness, I know how to handle unforeseen situations

Not at all true: ☐ : ☐ : ☐ : ☒ Exactly true

I can remain calm when facing difficulties because I can rely on my coping abilities

Not at all true: ☐ : ☐ : ☐ : ☒ Exactly true

No matter what comes my way, I'm usually able to handle it:

Not at all true: ☐ : ☐ : ☐ : ☒ Exactly true

It took me 25min
to complete.

Appendix 32
Phase Two process:
The final version of the questionnaire



Date: _____ **Participation code:** _____
Years of midwifery practice: _____

We would like to gather your opinions and experiences about aspects of working with obese, pregnant women and controlling gestational weight gain during pregnancy. A previous study was conducted that consulted obese, pregnant women and health care professionals that care for obese, pregnant women about their views and experience of body weight and weight gain during pregnancy. The questions in this questionnaire are based on the results of that study. We will use the results of these questionnaires to evaluate the measures that we have developed to facilitate midwifery involvement in supporting obese, pregnant women with controlling their gestational weight gain.

Please enter the date and the participation code that you have been given and your numbers of years as a practising midwife in the spaces above. Your participation code is needed for follow-up surveys. All responses to this survey are completely anonymous. The only identifying information (the single sheet held by the researcher that has your name and allocated participation code on it) will be stored separately from the surveys in a locked room within the university and may only be accessed by the research team. This sheet allows a member of the research team to remove your data from the study at a later date should you contact us to ask us to remove your data. **Please be assured that your data will remain confidential**

My supporting obese, pregnant women with controlling their gestational weight gain by using a resource for the next two months would be

Bad : __ : __ : __ : __ : __ : __ : __ : Good

Worthless : __ : __ : __ : __ : __ : __ : __ : Valuable

Supportive : __ : __ : __ : __ : __ : __ : __ : Critical

Harmful : __ : __ : __ : __ : __ : __ : __ : Beneficial

Simple : __ : __ : __ : __ : __ : __ : __ : Complex

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not increase my knowledge around controlling gestational weight gain in obese, pregnant women

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will increase the likelihood of obese, pregnant women controlling their gestational weight gain *early* in their pregnancy

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to share information that outlines relative risks to health and potential pregnancy complications with obese, pregnant women

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to take action *regularly* to support controlling gestational weight gain in obese, pregnant women in the future

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to use the pregnancy as a trigger point to offer support

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will not help me to give helpful guidelines about a good diet for weight management in pregnancy

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help me to give some meal ideas for weight management in pregnancy

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

My using a resource to support obese, pregnant women with controlling their gestational weight gain over the next two months will help to reinforce my consultation advice to obese, pregnant women when they are at home

Extremely likely : __ : __ : __ : __ : __ : __ : __ : Extremely unlikely

Not increasing my knowledge about supporting obese, pregnant women with controlling their gestational weight gain is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

My engaging obese, pregnant women with controlling their gestational weight gain is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Not sharing information about the relative health risks and potential pregnancy complications with obese, pregnant women is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Not acting *regularly* in the future to support obese, pregnant women with controlling their gestational weight gain is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Not using pregnancy as a trigger point to offer support is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Not giving obese, pregnant women helpful guidelines about a good diet for weight management in pregnancy is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Giving obese, pregnant women helpful guidelines about some meal ideas for weight management in pregnancy is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

Reinforcing my consultation advice to obese, pregnant women when they are at home is

Extremely good : __ : __ : __ : __ : __ : __ : __ : Extremely bad

The National Institute for Health Care Excellence think

I should: __ : __ : __ : __ : __ : __ : __ : I should not

use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months

The NHS maternity service thinks

I should: __ : __ : __ : __ : __ : __ : __ : I should not

use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months

The Nursing and Midwifery Council think that

I should: __ : __ : __ : __ : __ : __ : __ : I should not

use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months

My line manager thinks

I should: __ : __ : __ : __ : __ : __ : __ : I should not

use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months

My colleagues think

I should: __ : __ : __ : __ : __ : __ : __ : I should not

use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months

Obese, pregnant women in my care think

I should: __ : __ : __ : __ : __ : __ : __ : I should not

use a resource to support obese, pregnant women with controlling gestational weight gain in the next two months

Generally speaking, how much do you want to do what the National Institute for Healthcare Excellence thinks you should do?

Very much: __ : __ : __ : __ : __ : __ : __ : Not at all

Generally speaking, how much do you want to do what the NHS maternity thinks you should do?

Very much: __ : __ : __ : __ : __ : __ : __ : Not at all

Generally speaking, how much do you want to do what the Nursing and Midwifery Council thinks you should do?

Very much: __ : __ : __ : __ : __ : __ : __ : Not at all

Generally speaking, how much do you want to do what your line manager thinks you should do?

Very much: __ : __ : __ : __ : __ : __ : __ : Not at all

Generally speaking, how much do you want to do what your colleagues think you should do?

Very much: __ : __ : __ : __ : __ : __ : __ : Not at all

Generally speaking, how much do you want to do what obese, pregnant women in your care think you should do?

Very much: __ : __ : __ : __ : __ : __ : __ : Not at all

I expect that I will be able to offer a supportive resource about controlling gestational weight gain to obese, pregnant women in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

I expect that I will not increase my knowledge base about controlling gestational weight gain in obese, pregnant women in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

I expect that I will be able to engage obese, pregnant women with controlling their gestational weight gain *early* in their pregnancy, in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

I expect that I will not share information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy with obese, pregnant women in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

I expect that I will always feel able to give weight management advice for controlling gestational weight gain to obese, pregnant women in the next two months

Extremely likely : __ : __ : __ : __ : __ : __ : Extremely unlikely

Offering a supportive resource to obese, pregnant women would enable me to support them with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : Completely disagree

Not increasing my knowledge base about controlling gestational weight gain would enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : Completely disagree

Engaging obese, pregnant women with controlling gestational weight gain *early* in their pregnancy would enable me to support them to control their gestational weight gain, during the next two months

Completely agree : __ : __ : __ : __ : __ : __ : Completely disagree

Not sharing information that outlines the relative risks to health and potential pregnancy complications of obesity in pregnancy would enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : __ : Completely disagree

Always giving weight management advice for controlling gestational weight gain to all obese, pregnant women would de-personalising the decision and enable me to support obese, pregnant women with controlling their gestational weight gain in the next two months

Completely agree : __ : __ : __ : __ : __ : __ : __ : Completely disagree

I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months

I will definitely offer support: __ : __ : __ : __ : __ : __ : __ : I will definitely not offer support

I currently offer obese, pregnant women support with controlling their gestational weight gain using a resource

Always: __ : __ : __ : __ : __ : __ : __ : Never

If someone opposes me I can find means and ways to get what I want

Exactly true: __ : __ : __ : __ : Not at all true

It is easy for me to stick to my aims and accomplish my goals

Exactly true: __ : __ : __ : __ : Not at all true

I am confident that I could deal efficiently with unexpected events

Exactly true: __ : __ : __ : __ : Not at all true

Thanks to my resourcefulness, I know how to handle unforeseen situations

Exactly true: __ : __ : __ : __ : Not at all true

I can remain calm when facing difficulties because I can rely on my coping abilities

Exactly true: ___ : ___ : ___ : ___ : Not at all true

No matter what comes my way, I'm usually able to handle it:

Exactly true: ___ : ___ : ___ : ___ : Not at all true

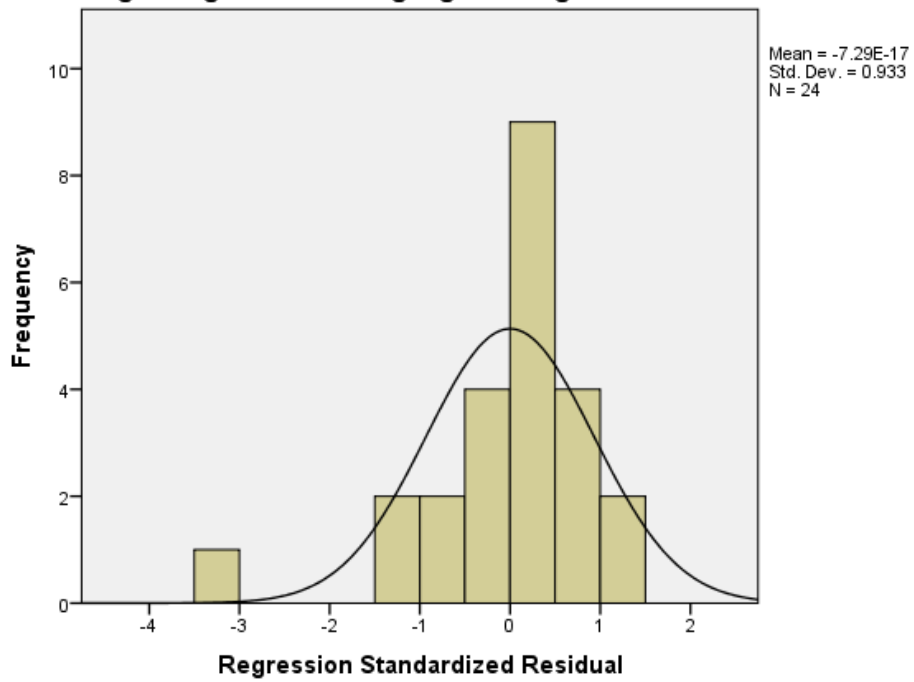
Appendix 33
Phase Three: Testing of the intervention

Phase Three: Histogram, P-Plot and Partial Regression Plots

Pre-intervention

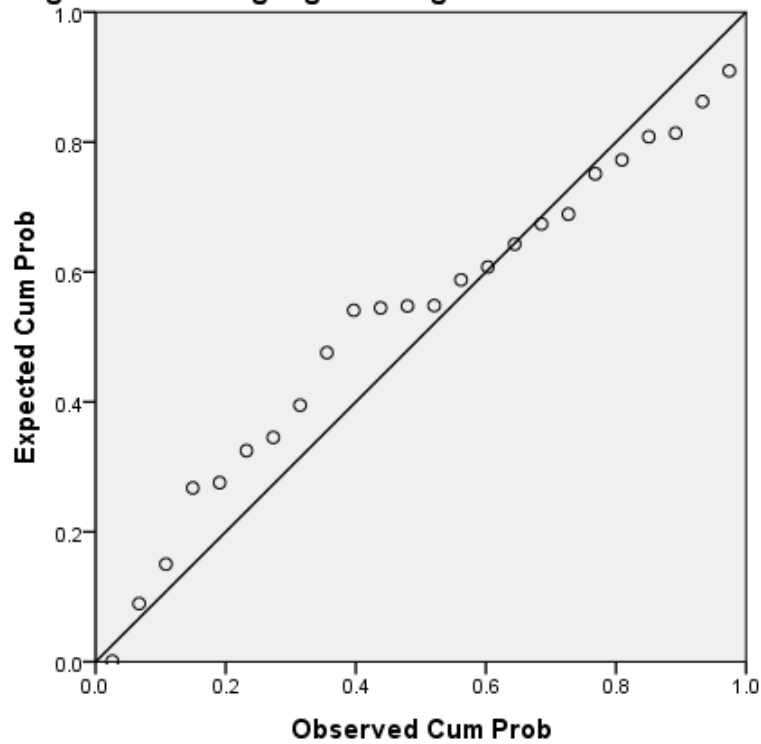
Histogram

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



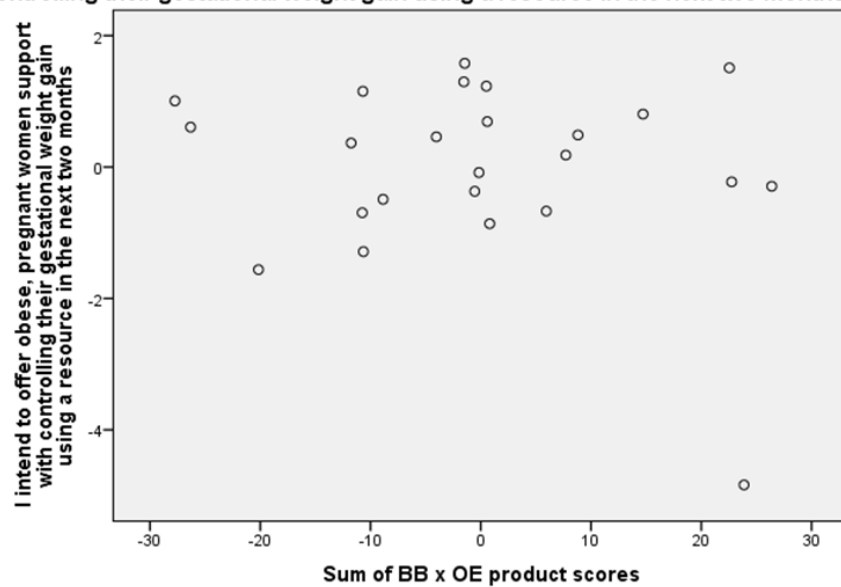
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



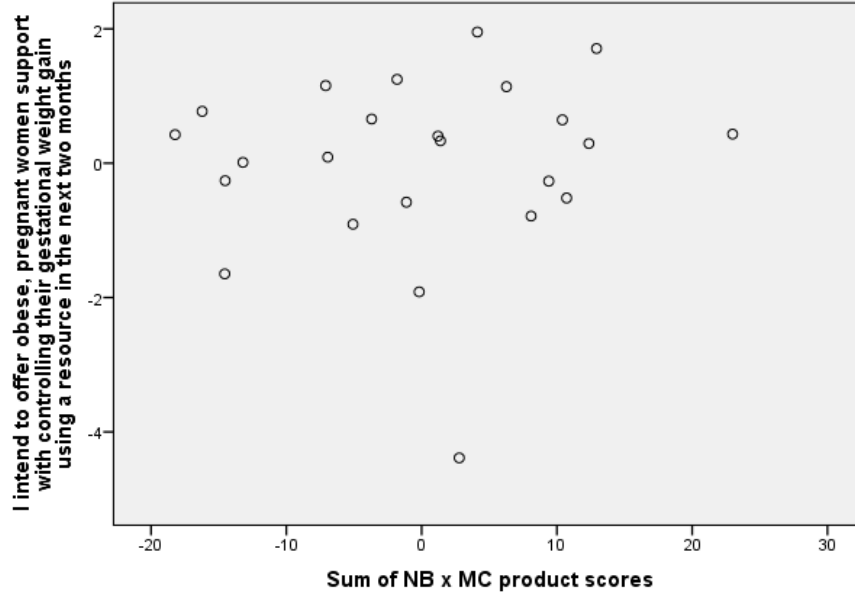
Partial Regression Plot

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



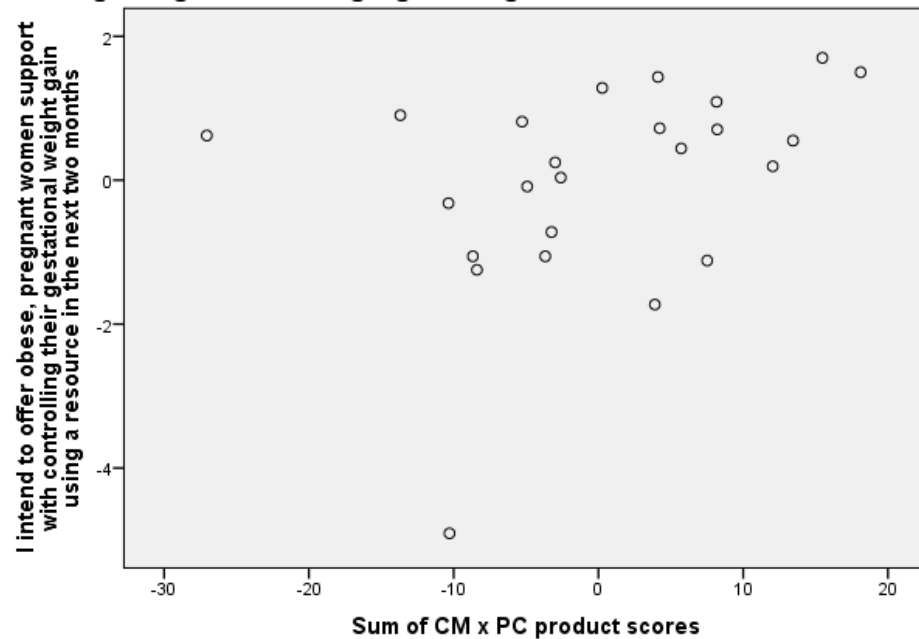
Partial Regression Plot

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



Partial Regression Plot

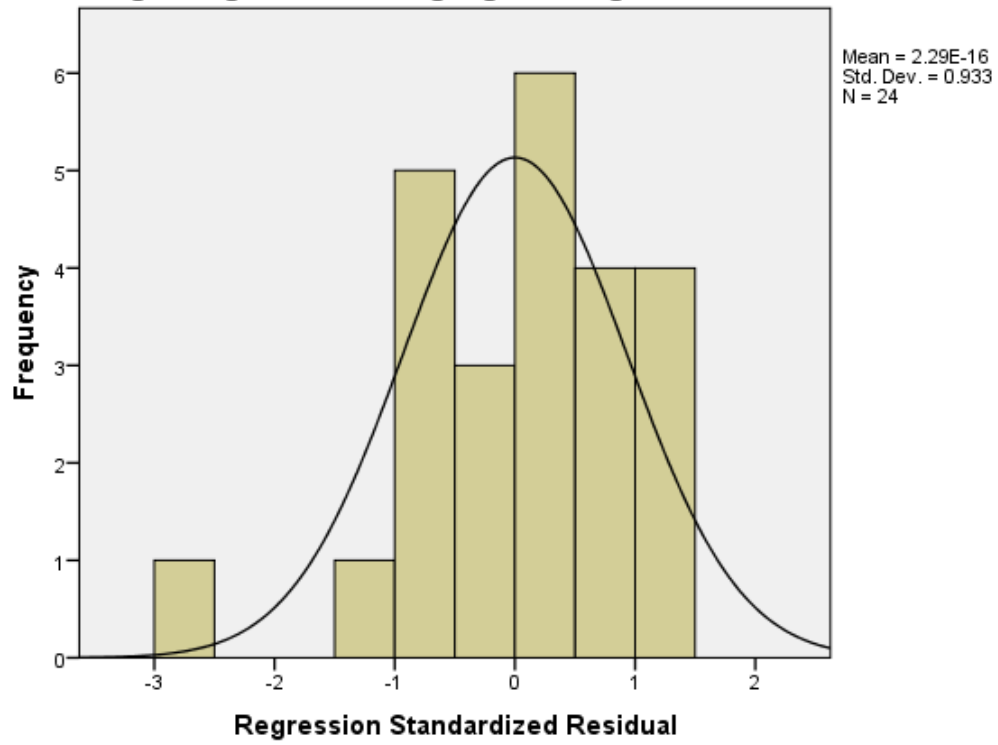
Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



Post-intervention

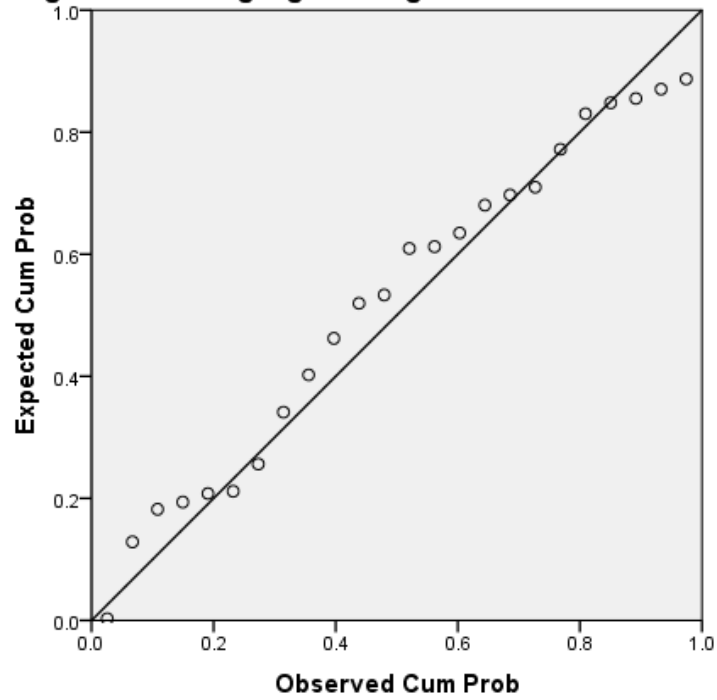
Histogram

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



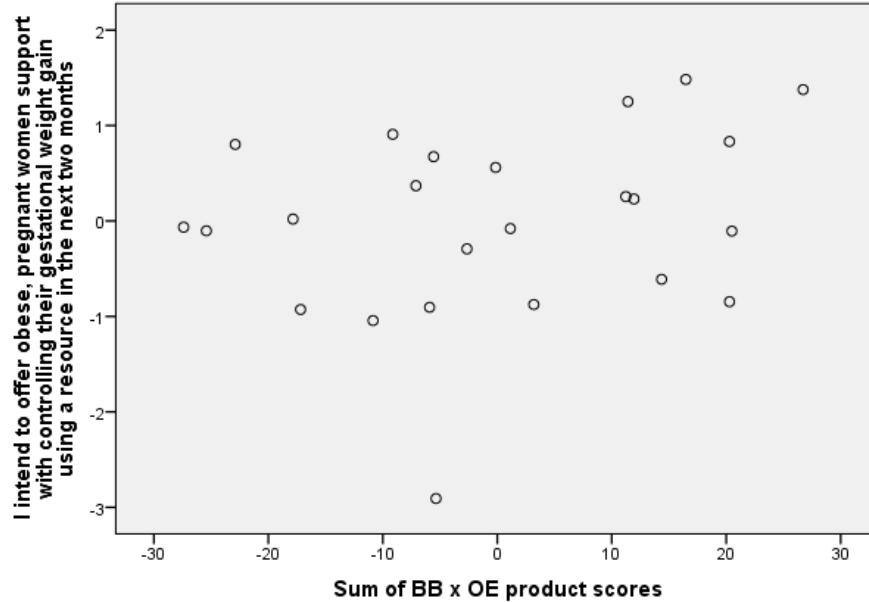
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



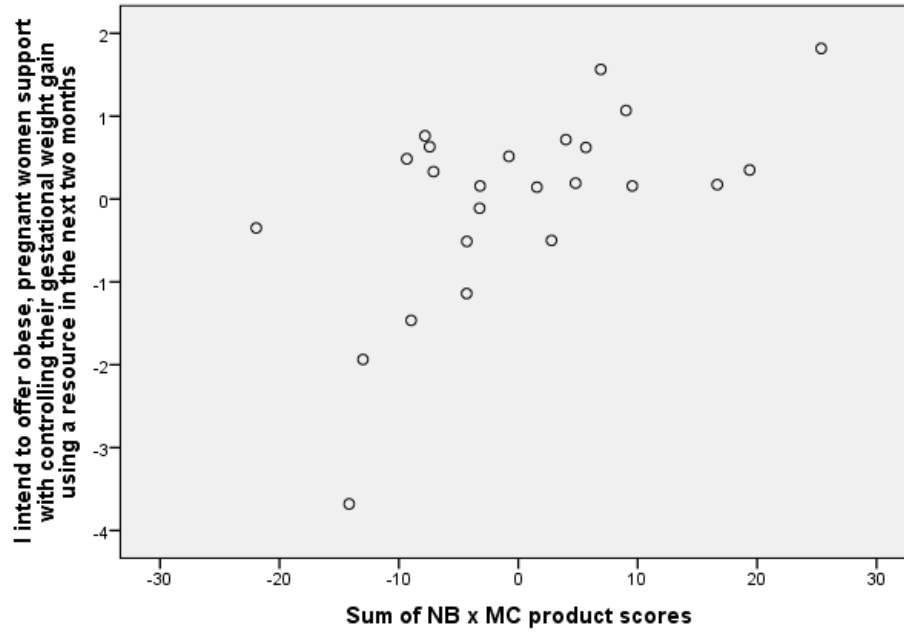
Partial Regression Plot

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



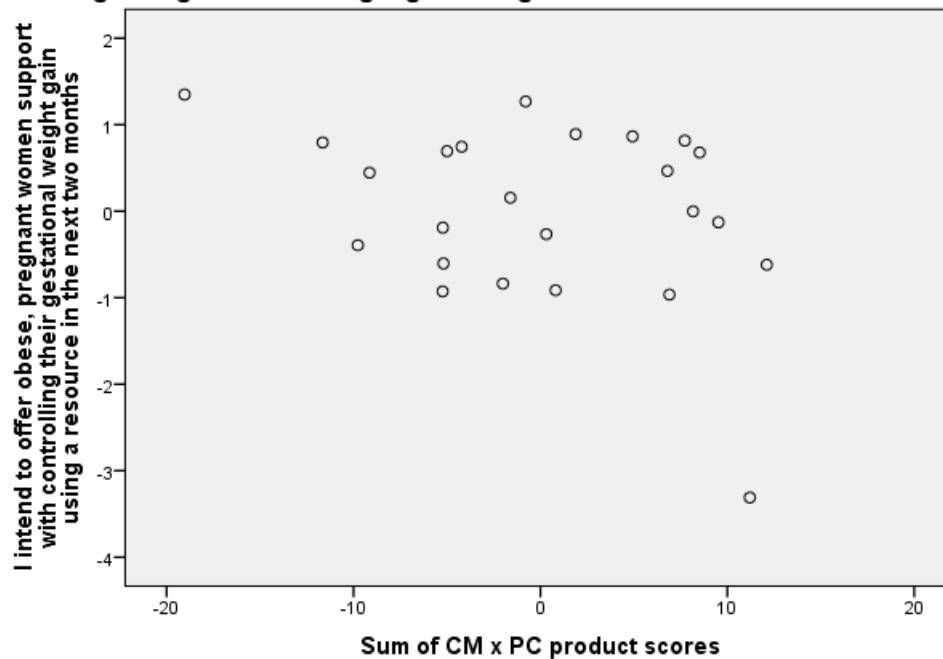
Partial Regression Plot

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



Partial Regression Plot

Dependent Variable: I intend to offer obese, pregnant women support with controlling their gestational weight gain using a resource in the next two months



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Research Article

Managing obesity in pregnancy: Are psychological dimensions of behavioural change important to midwives and women?

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Abstract

Currently a quarter of British women are obese. It is well known that maternal obesity increases the risk of suboptimal pregnancy outcomes. The National Institute for Health and Care Excellence (NICE) in the UK recommends that pregnant women should be given advice and support on achieving appropriate weight gain during pregnancy. However, evidence suggests that such advice relating to diet and physical activity in pregnancy is inconsistent, as well as sometimes being ineffectual. Recent research shows that many midwives at the forefront of maternity care lack the confidence to discuss weight gain during pregnancy with obese women, and midwives recognise that further training concerning weight gain would enhance their ability to support obese women. Concerns include offending and potentially disengaging women from health services. This paper considers the policy position on diet and activity for obese, pregnant women and the evidence for nutrition and lifestyle intervention for controlling gestational weight gain. It is suggested that the inclusion of a psychological dimension may increase the efficacy of interventions relating to obesity during pregnancy. Recommendation is made for a controlled trial for community midwives examining the efficacy of behaviour change intervention, underpinned by psychological theory that would enable community midwives to offer specific advice and support for obese, pregnant women.

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Introduction

The World Health Organisation (2013) defines obesity, as an “abnormal or excessive fat accumulation that may impair health”. Whilst obesity is widely identified

as individuals with a body mass index (BMI) ≥ 30 kg/m², the WHO’s internationally agreed definition further classifies different levels of obesity (Table 1.)

Table 1: The international classification of overweight and obesity

BMI	Weight Category
18.5 – 24.99	Normal
25 -29.99	Pre-obese
30 – 34.99	Obese class I
35 – 39.99	Obese class II
≥ 40	Obese class III

Source: WHO

In 2008 the WHO indicated that 1.6 billion adults worldwide were overweight or obese, and that at least 300 million women were obese. Furthermore, over 40 million children under the age of five were overweight and approximately 50% of those will become childbearing women who may also become obese. Determinants of being overweight or obese were the same for all countries examined and included biological, psychological as well as sociological factors; making a multidisciplinary approach essential for a global strategy. The global increase in body weight is reflected in the UK population and in many other European countries. Currently a quarter of all women in Britain are obese (PHE, 2013). Unsurprisingly this demographic is reflected in the pregnant population (Heslehurst et al, 2007) and with increased body weight comes greater risks to health as well as a poorer long term prognosis of the offspring (Schack-Nielsen et al, 2010).

Pregnant women with a higher BMI are significantly more likely to experience adverse pregnancy outcomes (Arrowsmith et al, 2011, Denison et al, 2008, Dennison et al 2010). Obesity during pregnancy is directly associated with increased health risks for women such as gestational diabetes, hypertension, and birth complications (Scott-Pillai et al, 2013); with a subsequent need for enhanced maternity care and increased costs of care (Dennison et al 2010, Wuntakal and

Hollingworth, 2009). Shorter term complications include difficulty in monitoring the fetus (Paladini, 2009) and risk of stillbirth (Scott-Pillai et al, 2013). Maternal obesity also poses increased health risks to the infant with the development of an obese phenotype (Desai and Ross, 2011), poorer newborn vascular health (Begg et al 2013) and newborns that require hospital admission (Scott-Pillai et al, 2013). Furthermore, there is evidence to suggest a relationship between obesity and maternal death; the Centre for Maternal and Child Enquiries and Royal College of Obstetricians and Gynaecologists in the UK identified a higher percentage of obesity in mothers who died compared with the general maternity population.

In 2004, the WHO adopted the ‘Global Strategy on Diet, Physical Activity and Health’ to substantially reduce deaths and non-communicable disease through diet and physical activity. A key principle of the Global Strategy was to take a ‘life-course perspective’ starting with maternal health and prenatal nutrition. The WHO suggested that research evaluating policies and interventions should be promoted; and that the increased presence of behavioural science in the field should contribute to the development of both local and national expertise.

Guidelines and policies: Where are we now?

The Quality Standard for Antenatal Care in the UK (NICE 2012) states that women with a BMI ≥ 30 kg/m², at first visit, should receive personalised healthy eating and physical activity advice from a trained professional. This advice may be delivered by dietitians for women who are class I and II obese, and further support may be provided by midwives and obstetric staff. NICE states that healthcare professionals should offer women this personalised support themselves at the first antenatal visit, unless they are insufficiently trained to do so, in which case they should refer the woman on to an appropriately trained professional.

Similarly, the CMAE/RCOG (2010) report 'Management of Women with Obesity in Pregnancy' recommends that all obese pregnant women should be given appropriate information about the risks of obesity in pregnancy. The risks should be reduced by offering dietary and lifestyle advice. A recommendation is also made on specialist education and training for healthcare professionals in relation to managing maternal obesity and the nutrition of pregnant women. Both the NICE and CMAE/RCOG guidance highlight the vital nature of pre-pregnancy, pre-natal and post-natal dietary and lifestyle advice; both on the short and long term health of the mother as well as her child. The guidelines are targeted at providing information and advice to women, as well as healthcare professionals caring for pregnant women.

These guidelines have now been in place for over four years and there is a need to evaluate how effective the guidelines are in assisting healthcare professionals to advise obese women. It is worthwhile investigating if healthcare professionals who encounter women at their first visit are, or perceive that they are, sufficiently knowledgeable and educated to discuss these issues. Macleod et al (2013) in a survey of midwives from a range of hospital and midwifery settings, found that less than half of their respondents regularly gave advice about the risks of obesity in pregnancy and the benefit of weight management during pregnancy, yet the

majority (77%) thought that such advice would be appropriate. The calculation and recording of BMI, in order to identify women who are obese at the start of their pregnancy, was found to be missed or incomplete in almost 10% of 486 maternity notes; due perhaps to a lack of facilities available to midwives at the point of booking (Rees et al 2012). Furthermore, in the UK, policy and guidance indicate that obese women should be offered referral to a dietitian. However, with such a significant proportion of the UK population with a BMI ≥ 30 kg/m², it is seen to be unrealistic to refer all obese, pregnant women to a dietitian.

Midwives: The forefront of maternity care

Maternal obesity has placed increasing demands on NHS maternity services, with the numbers of obese, pregnant women more than doubling since 1989 (Heslehurst et al 2007). Midwives and healthcare professionals suggest that pregnancy may be a good opportunity to enhance women's engagement with health services, with their pregnancy providing an opportunity to address obesity (Heslehurst et al, 2013). However, healthcare professionals voiced anxieties about using maternity care as a platform for raising obesity issues, with the risk of offending or disengaging women from health services. Phelan (2010) suggested that pregnancy was a "teachable moment" because women may attach an increased value to their health, since it concerned both mother and baby. Maternity healthcare professionals also identified that further training would be required to enable them to broach and support issues of body weight and weight gain during pregnancy (Heslehurst et al 2011, 2013).

Midwives felt that in other health-related behaviours, training and education had an impact on confidence and motivation to raise then manage sensitive issues in their practice (Heslehurst et al, 2013). Midwives are at the forefront of maternity care in the UK, and in the vast majority of cases, are the healthcare professional that has the most frequent contact with a pregnant

woman throughout her pregnancy. It could be suggested, therefore, that midwives are in an optimum position to communicate with pregnant women about body weight and weight gain during pregnancy, as well as post-birth. Midwives have expressed concern about the potential of affecting the unique relationship of trust that they had with women, and the potential to disengage women from maternity services if communication about weight and weight management was not sensitively managed (Schmied et al 2011). Singleton and Furber (2014) reported that midwives experienced a sense of helplessness about their own care provision for obese, pregnant women. Nyman et al (2011) suggested that healthcare professionals, including midwives, needed to examine their own attitudes and beliefs about obesity in order to optimise their care of obese pregnant women and offer practical and well informed guidance. In a quantitative analysis of the experiences of over 600 Australian women who gave birth during 2009, there was a relationship between women with a raised BMI and self-reported poorer treatment during pregnancy and post-natally. Furthermore, final year medical and midwifery students held less positive views of patient self-care and more negative attitudes towards pregnant women who were overweight and obese rather than healthy weight, pregnant women (Mulherin et al, 2013). Whilst it is difficult to justifiably expand the perceptions of medical students and midwifery students to the population of practicing doctors and midwives, the perception of weight stigma in maternity care expressed by pregnant women with raised BMI suggests that there is the opportunity to improve the way in which weight management in obese, pregnant women is approached.

Pregnancy can be seen as an opportunistic time to address the issue of gestational weight gain in obese, pregnant women. At this time women are given information related to other aspects of healthy lifestyle such as smoking cessation and reducing alcohol consumption and the issue of nutrition, exercise and healthy weight gain has the potential to be incorporated within

the first initial consultation with the midwife. Pregnancy is often seen as a time when women will listen to and act upon the advice given by the midwife.

Dietary and physical activity interventions in a pregnant population

In 2010 a comprehensive systematic review of dietary and/or physical activity interventions for controlling weight gain in pregnancy was produced by the SCHARR Public Health Collaborating Centre (Campbell et al, 2010). Key to the development of public health guidance for promoting weight management in pregnancy; this extensive review of the literature found few studies that appraised the effectiveness of dietary and/or physical exercise intervention on gestational weight management. The studies that were included indicated inconsistent and inconclusive findings about the efficacy of dietary and/or physical activity interventions for controlling weight gain in pregnancy. An update to the review in 2011 found that there remained no significant effect of intervention on weight gain during pregnancy. Contradictory information about healthy weight management was frequently reported by women. Some interventions sought to address the issue of inconsistent information for women, nevertheless, there was no significant effect found on controlling gestational weight gain.

Evidence for the efficacy of dietary and lifestyle intervention on controlling excessive gestational weight gain was found in a randomised control trial that utilised group exercise sessions, home diet, and exercise counselling in the intervention group however obese, pregnant women were not examined as an independent subset of the intervention group. The lifestyle intervention significantly reduced the occurrences of excessive gestational weight gain (35% in the intervention group gained excessive gestational weight compared to 55% in the control group). The intervention group also reported increased daily activity, and improved diet (Hui et al, 2012). These findings suggest that utilising a lifestyle intervention of this

type may contribute to managing gestational weight gain. However obese, pregnant women were not examined as an independent sub-set of the intervention group. Consequently, there is scope for examining the effect of a dietary and lifestyle intervention on an obese, pregnant population.

Another dietary and physical activity intervention reviewed normal weight and overweight/obese women in the “Fit for Delivery” study (Phelan et al 2011). This sought to control gestational weight gain so that the Institute of Medicine (IOM, 2009) guidelines were not exceeded. This was achieved in women of normal weight, but there was no significant effect on the overweight/obese women. These findings suggest that whilst the low intensity behavioural intervention was successful with normal weight women, it was deemed likely that a more intensive behavioural intervention involving a greater proportion of face-to-face contact may be necessary for overweight/obese women. Although these studies identified positive results in non-obese women, the findings cannot be generalizable to obese, pregnant women.

Psychological intervention in weight management: Raising some issues

In a systematic review exploring psychological intervention for overweight or obesity, Shaw et al (2005) examined the efficacy of behavioural and cognitive therapy strategies; both as weight loss strategies alone and in combination with diet/exercise strategies. The strategies examined included: behavioural therapies such as self-control and therapist controlled strategies, self-monitoring, problem-solving and goal-setting; cognitive behavioural therapy; psychotherapy; relaxation therapy and hypnotherapy. Shaw et al examined psychological intervention for weight loss in the general overweight and obese population. The greatest success was seen with the behavioural plus diet/exercise intervention. Such an approach including a psychological intervention could arguably apply to managing weight during pregnancy.

There are many interrelating factors that motivate eating behaviour; some tangible such as the cost and taste of foods, others less so concerning social climate, culture and the psychological determinants of food choice (European Food Information Council, 2005). Changing the dietary habits of obese, pregnant women to control gestational weight gain inevitably requires more than informational support and should include a sound psychological, theoretical framework in the design of any intervention to increase the likelihood of behavioural change. The behavioural intervention should improve clinical and psychological outcomes, but as yet research is sparse.

The SchARR review sought to explore how contextual factors such as the beliefs of the individual or society influenced the efficacy of interventions (Campbell et al 2010). They found that dietary attitudes and behaviours before pregnancy were carried forward into pregnancy eating behaviours (Warriner 2000). Beliefs about the risks versus benefits to the fetus affected pregnancy eating behaviour (Fairburn, 1990, Wiles and Wiles, 1998). The beliefs of significant others, such as healthcare professionals, many also influence the amount of support offered to pregnant women (Heslehurst et al 2007). Whilst Campbell et al (2010) discussed evidence for contextual influence on intervention in terms of the views, attitudes and beliefs of pregnant woman and their significant others; these were not examined specifically as psychological constructs, but as descriptors of the type of influences seen in the research. Psychological outcomes of interventions are present as measures of maternal psychological wellbeing such as quality of life and self-esteem. These measurements feature as secondary maternal outcomes, yet the role of psychology in controlling gestational weight gain extends beyond just psychological wellbeing. Whilst a relationship between context and intervention success was identified the nature of how context influences outcome was not revealed.

Psychological aspects of gestational weight management are not only relevant for the design of controlled clinical trial interventions with women, but also for the design of educational interventions for midwives to facilitate the implementation of weight control advice and guidance into everyday practice. Empowering midwives in this way could potentially have paramount influence on weight management in pregnancy. There were three major barriers to the delivery of optimum support for overweight and obese pregnant women. These were the knowledge, attitudes and time constraints of healthcare professionals involved in their care (Cogswell et al, 2001). Therefore, these issues need addressing directly with healthcare professionals. Since only a small number of obese, pregnant women may be referred to a dietitian or other specialist weight control intervention, changing midwives behaviour could have the greatest impact.

Strengthening intervention with psychological theory

Many of the barriers perceived by midwives to their delivery of effective support for obese pregnant women could be addressed by the development of theoretically grounded and robust controlled trial of a resource and accompanying training for midwives. There are early indications that the utilisation of psychological theory in the design and evaluation of interventions may increase the scope and quality of the research and improve clinical and psychological outcomes. Since results of interventions related to controlling gestational weight gain in obese, pregnant women so far have been inconsistent and inconclusive, future intervention should be tested in a controlled trial to strengthen and expand the evidence base. However, the development of the intervention must also be grounded in a solid theoretical framework. A rigorous consultation with obese, pregnant women and healthcare professionals that are involved in their care should be conducted. This would gather the experiences of obese, pregnant women and healthcare professionals concerning

controlling gestational weight gain to establish what facets an intervention should include; and identify the psychological aspects of gestational weight control such as personal perceptions, barriers, attitudes, beliefs. This would tailor the design and delivery of a resource and training package for midwives, concerning gestational weight control which is acceptable to midwives and women.

Considering a psychological model: Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) is a psychological framework that provides a perspective from which to 1) design an intervention and 2) evaluate the effects of that intervention. The TPB considers aspects of cognition within a specific population (such as what someone may believe or the influences of significant others) about a specific issue (such as weight) and provides a structure on which to base the design of an intervention. A TPB-based intervention is entirely situation and population specific and is a different approach to using therapeutic practices such as Cognitive Behavioural Therapy (CBT). Therapeutic practices such as CBT have been used in many health related settings and whilst the inclusion of some psychological therapy has been seen to strengthen interventions beyond standalone therapy, findings are inconsistent and inconclusive (Shaw et al, 2009). Therapeutic practices are fundamentally different from TPB which is a psychological theory and they perform different functions in research and design.

The TPB seeks to understand the internal cognitive processes underlying behaviour performance (Ajzen, 1985). The TPB has been successfully applied to a wide range of social and health behaviours. Examples include: the intention to attend prostate screening services (Hevey et al, 2009); physical exercise (Nigg et al 2009) and smoking cessation (Rise, 2008). The TPB hypothesizes that the behavioural outcome is best predicted by behavioural intention. The model proposed that behavioural intention is determined by attitude to the

behaviour, subjective norm (that is, perceived social influence) and perceived behavioural control over the performance of the target behaviour. For example, every day when Katy, who is in the early stages of her pregnancy and takes her lunch break at work; she purchases convenience food from the work vending machine despite holding a generalised intention to eat more healthily. According to the TPB, this might be due to three main factors. First, a belief that the outcome of this behaviour would enable her to return to her desk more quickly than if she bought a healthy salad from the shop across the road (behavioural belief and attitude). Second, Katy may in part choose the work vending machine to purchase food quickly due to perceived pressure from her line manager and others to take as short a lunch break as possible (normative beliefs and subjective norm). Finally, although Katy recognises that she could achieve her goal of eating healthily and taking a shorter lunch break by bringing her own food to work, she was unable to go to her local shop the previous evening due to other commitments with her young family (control beliefs and perceived behavioural control).

Attitude to the behaviour is formed by behavioural beliefs regarding the expected outcome of the behaviour; subjective norm by beliefs about the expectations of others and motivations to comply with these expectations; whilst perceived behavioural control is determined by control beliefs concerning the power of factors that may influence whether the behaviour happens or not. The more positive the attitude and perceived social influence plus the greater the individual's perception of control over the behaviour, the stronger that individual's behavioural intention should be.

Considering the above, it would therefore seem reasonable to suggest that an intervention plan should seek to address all three facets of the TPB. Thus: 1) Attitude - Change midwives' attitudes towards the behaviour of broaching discussion about gestational weight gain with obese women by changing beliefs about the likely outcome of the behaviour. For example,

create a universal path of support for obese women that assure midwives that if they broach the subject of body weight and controlling gestational weight gain, the midwifery service will be able to provide some support for obese women with controlling their gestational weight gain. 2) Subjective Norm - Address the midwives' beliefs about the perceived social pressure to perform (or to not perform) a behaviour. For example, create a consistently agreed midwifery service process and 'script' for all midwives to follow thereby removing the individual midwife's pressure to make a personal decision to broach the subject and how to deliver the subject matter. 3) Control Belief - Develop an increased sense of control over the behaviour in the individual. For example, by equipping midwives with some instantly accessible support materials (such as an information pack that outlines optimal weight gain during pregnancy for each of the weight categories, the benefits of controlling weight gain and information about how to eat well for pregnancy) that they may share and discuss with obese women, thereby giving midwives control over their capacity to offer tangible support.

Improving the expectations of midwives about the outcomes of any discussion on controlling gestational weight gain with obese women; improving midwives' beliefs about what their peers think about raising such a discussion, and furthermore increasing midwives' sense of control about their capacity to offer support may significantly increase midwives' intention to broach this discussion. Increasing intention may in turn increase the likelihood of midwives broaching a discussion about controlling gestational weight gain with obese, pregnant women.

Conclusion

In the absence of any current, consistently efficacious intervention for controlling gestational weight gain in obese, pregnant women, a rationale is needed for developing and testing an intervention underpinned by a psychological framework. Community midwives operate at the forefront of maternity care, and are

best placed to deliver advice and guidance regarding body weight during pregnancy to patients. Currently, midwives have significant reservations about how to broach discussion about, and offer support for, controlling gestational weight gain. Any intervention could be underpinned by TPB theory as applied to obesity during pregnancy, and should be developed for community midwives. To increase confidence in using the intervention, the

protocol should be validated in a controlled trial. Behavioural intervention which would seek to enable community midwives to offer specific advice and support for obese, pregnant women may increase the likelihood of them offering support and advice about body weight and weight gain during pregnancy beyond their current midwifery practice.

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Reducing the risk of gestation diabetes by controlling gestational weight gain in obese, pregnant women: using the theory of planned behaviour

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Background: There is a known risk of gestational diabetes (GDM) for pregnant women with body mass index > 30; controlling gestational weight gain for the prevention of GDM is a health priority. The theory of planned behaviour (TPB) has been successfully applied to a wide range of health behaviours including weight management but as yet not for obese pregnant women.

Methods: This study forms the information gathering and development stage of a weight management intervention for obese, pregnant women using TPB. Interviews and focus groups were conducted with a purposive sample, hospital/community midwives (MW) (n = 22), obstetricians (OB) (n = 2), dietitians (D) (n = 4) and obese pregnant women (n = 19), to explore the knowledge, understanding and experience of body weight/weight gain during pregnancy. Data were analysed using content analysis (n = 47). TPB Facet Behavioural Belief MW1: 'It's not always well received'. MW2: 'No, it's a very tricky subject'. MW: 'It could be done at the beginning. You've got the next seven, eight months to enforce it rather than the last month, two...'. Normative Belief OB: 'Our focus I suppose as doctors, it's awful really, but we are focused on dealing with the situation that faces us. We don't perhaps concentrate perhaps as we should on preventing them from getting bigger....'. Control Belief D: 'Erm, availability and capacity I think, because I don't think there is that much capacity'.

Conclusions: Behaviour was identified utilising TPB and used to inform the design of a weight management intervention for obese, pregnant women, reinforcing the intervention design with a validated theoretical framework.